

Drake Street

Traffic Impact Analysis

Columbia, South Carolina

November 2022



DocuSigned by:
Cliff Lawson
A71C57A8A9564D7...

11/2/2022

Prepared for:

Terra Alta Ventures

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1 INTRODUCTION

This report presents the Drake Street traffic impact analysis (TIA) findings. The proposed development will be located off Drake Street between Norris Street and Clifton Street in Columbia, SC (see **Figure 1-1**). The proposed development will consist of 150 multi-family residential units and will be constructed by 2023.

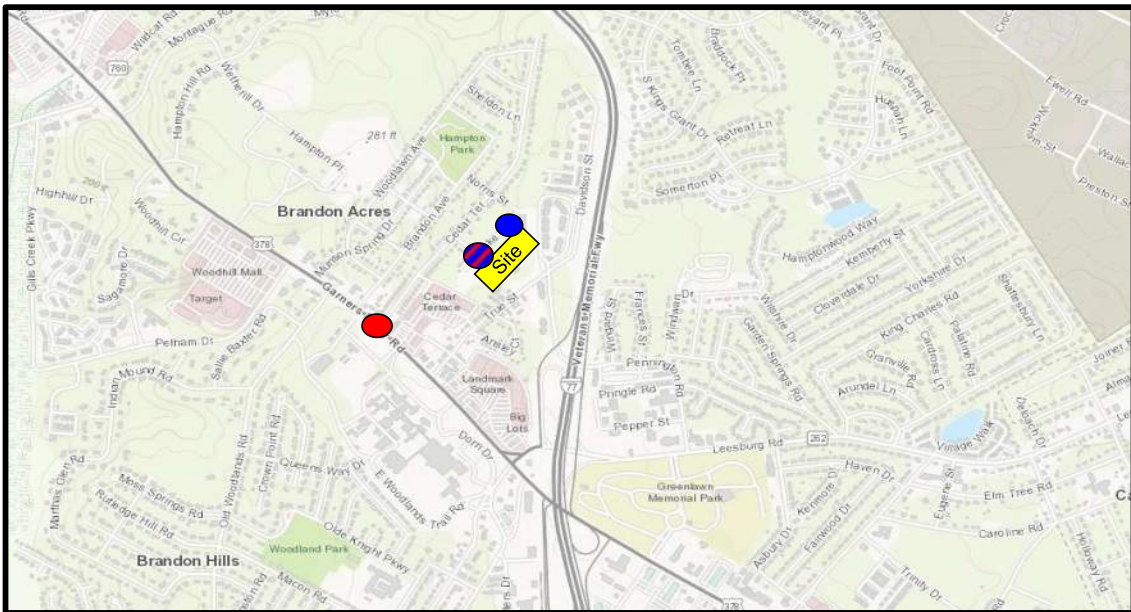
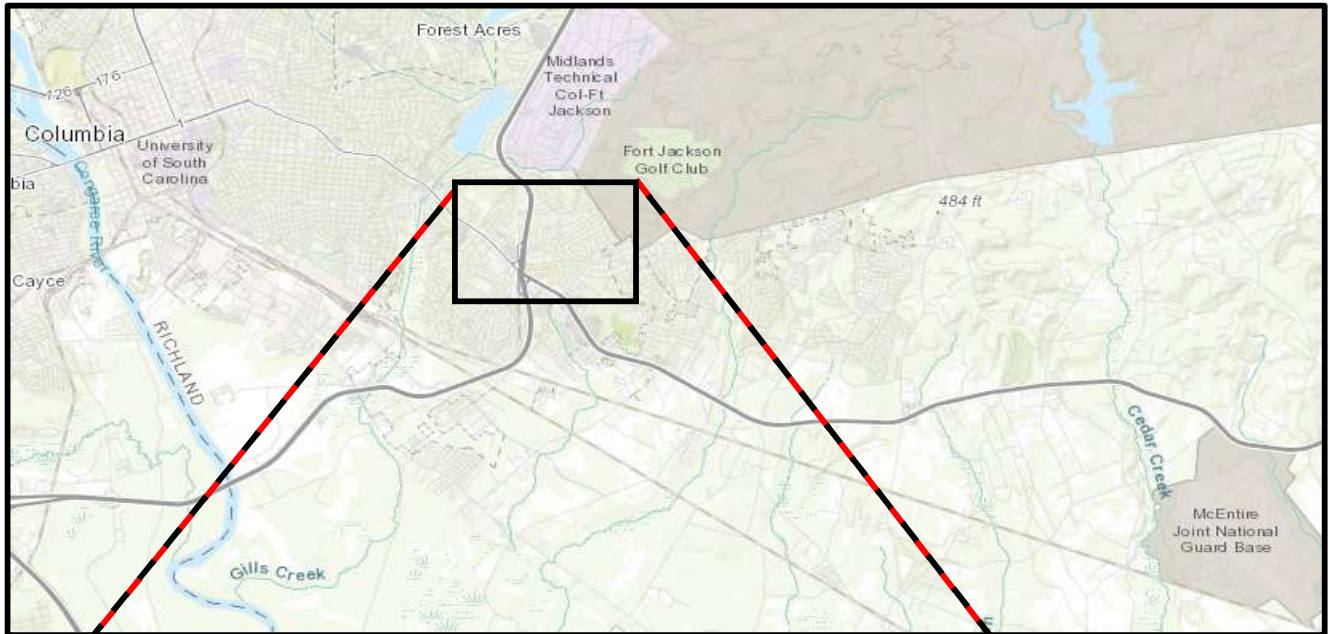
Analyses were completed for the following scenarios:

- 2022 Existing traffic volumes;
- 2023 Background traffic volumes; and
- 2023 Build traffic volumes (Background + site trips).

The purpose of this TIA is to verify that the existing geometry provided within the study area is sufficient to accommodate the projected traffic volumes, and to determine what, if any, improvements are necessary.

The following steps were taken to determine the potential traffic impacts associated with this project:

1. Data Collection – AM (7:00 – 9:00) and PM (4:00 – 6:00) peak period turning movement counts were collected in August 2022 at the following intersections:
 - US-76 (Garners Ferry Road) / Cedar Terrace - unsignalized; and
 - Drake Street / Clifton Street – unsignalized.
2. Trip Generation/Future Traffic – Traffic generated by the proposed development was estimated using the 11th Edition of the Institute of Transportation Engineers *Trip Generation Manual*. Trip generation was calculated for the development following SCDOT standards and practices for trip generation. Projected traffic volumes were calculated using a 2% ambient growth rate. Per discussion with City staff, there are currently two (2) approved developments within the project study area.
3. Trip Distribution and Projections – The site-generated trip distribution was based on existing area traffic and engineering judgement. It was assumed, for purposes of analysis, that projected trips for the Drake Street Development would follow similar patterns as existing traffic.
4. Traffic Capacity Analysis – Level of service analyses were performed using Synchro Version 10.3 for the following intersections:
 - Garners Ferry Road / Cedar Terrace;
 - Drake Street / Clifton Street / Site Access 1; and
 - Drake Street / Site Access 2.



Legend	
●	= Study Area Intersection
●	= Driveway Intersection
	= Driveway / Study Area Intersection

2 EXISTING INFORMATION

The proposed development will be located off Drake Street between Norris Street and Clifton Street in Columbia, SC (see **Figure 1-1**).

2.1 STUDY LIMITS

Access to the proposed site will be provided via two (2) full movement connections to Drake Street. Site accesses are shown graphically in **Figure 1-1** and the preliminary site layout in **Figure 2-1**. All figures are located at the end of their respective chapter.

The study limits include the following three (3) intersections:

- Garners Ferry Road / Cedar Terrace;
- Drake Street / Clifton Street / Site Access 1; and
- Drake Street / Site Access 2.

2.2 EXISTING ROADWAYS

US-76 (Garners Ferry Road) is an undivided facility with a varying cross-section, running approximately east-west in the study area. The facility is classified by SCDOT as a principal arterial. Within the study area, US-76 has a posted 40-mph speed limit and provides connection between I-77 and downtown Columbia. Per 2021 SCDOT Average Annual Daily Traffic (AADT) data, US-76 carries 44,300 vehicles per day (VPD) between Rosewood Drive and Leesburg Road.

Cedar Terrace is an undivided facility with a two-lane cross section, running approximately north-south in the study area. Cedar Terrace has a posted 25-mph speed limit and serves residential uses. There is no AADT available for this facility.

Clifton Street is an undivided facility with a two-lane cross section, running approximately east-west in the study area. Clifton Street has a 25-mph speed limit and serves residential uses. There is no AADT available for this facility.

Drake Street is an undivided facility with a two-lane cross section, running approximately north-south in the study area. Drake Street has a 25-mph speed limit and serves residential uses. There is no AADT available for this facility.

2.3 EXISTING INTERSECTIONS

Using available aerial imagery, Timmons Group compiled the existing geometry for each study area intersection. The existing intersection geometry is shown in **Figure 2-2**.

US-76 / Cedar Terrace is an unsignalized intersection with the southbound approach encountering the stop condition. The southbound approach consists of a shared left-turn / right-turn lane. The eastbound approach includes an exclusive left-turn lane and three through lanes. The westbound approach consists of two through lanes and a shared through / right-turn lane.

Drake Street / Clifton Street is an unsignalized intersection with the southbound approach encountering the stop condition. The northbound approach consists of a shared left-turn / through lane. The southbound approach includes a shared through / right-turn lane. The eastbound approach includes a shared left-turn

/ right-turn lane. Due to Synchro limitations this intersection was analyzed as an all-way stop. This represents a worst-case scenario from a delay perspective.

2.4 TRAFFIC VOLUMES

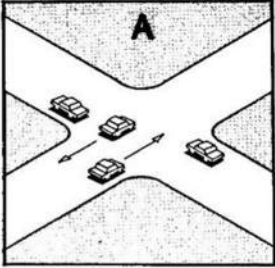
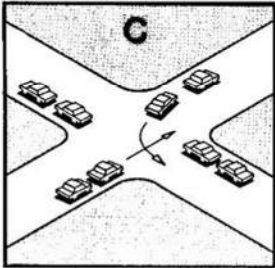
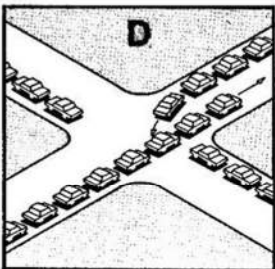
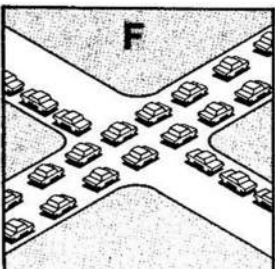
Timmons Group calculated peak hour volumes at the study area intersections using the collected AM (7:00 – 9:00) and PM (4:00 – 6:00) peak period turning movement counts undertaken in August 2022. Collected traffic count data is summarized in **Figure 2-3**. Traffic count data is found in **Appendix B**.

2.5 CAPACITY ANALYSIS

Using aerial photography, and traffic count data, traffic operations were analyzed during 2022 (existing) and 2023 (without and with the proposed development site trips).

Capacity analysis allows traffic engineers to determine the impacts of traffic on the surrounding roadway network. The Transportation Research Board's (TRB) *Highway Capacity Manual* (HCM) methodologies govern how the capacity analyses are conducted and how the results are interpreted. There are six letter grades of Levels of Service (LOS) from A to F, with LOS A representing the best operating conditions and LOS F the worst operating conditions. At signalized intersections, an overall intersection LOS E (or worse) is generally considered unacceptable. Similarly, at unsignalized intersections, a LOS E (or worse) is generally considered unacceptable. Nevertheless, it is not uncommon for side streets to function unacceptably during peak traffic periods because the traffic volumes often do not warrant a traffic signal to assist side street traffic. **Table 2-1** shows in detail how each of these levels of service are interpreted.

Table 2-1: Level of Service Definitions

Level of Service	Roadway Segments or Controlled Access Highways	Intersections	
A	Free flow, low traffic density.	No vehicle waits longer than one signal indication.	
B	Delay is not unreasonable, stable traffic flow.	On a rare occasion motorists wait through more than one signal indication.	
C	Stable condition, movements somewhat restricted due to higher volumes, but not objectionable for motorists.	Intermittently drivers wait through more than one signal indication, and occasionally backups may develop behind left turning vehicles, traffic flow still stable and acceptable.	
D	Movements more restricted, queues and delays may occur during short peaks, but lower demands occur often enough to permit clearing, thus preventing excessive backups.	Delays at intersections may become extensive with some, especially left-turning vehicles waiting two or more signal indications, but enough cycles with lower demand occur to permit periodic clearance, thus preventing excessive backups.	
E	Actual capacity of the roadway involves delay to all motorists due to congestion.	Very long queues may create lengthy delays, especially for left-turning vehicles.	
F	Forced flow with demand volumes greater than capacity resulting in complete congestion. Volumes drop to zero in extreme cases.	Backups from locations downstream restrict or prevent movement of vehicles out of approach creating a storage area during part or all of an hour.	

SOURCE: "A Policy on Design of Design of Urban Highways and Arterial Streets" - AASHTO, 1973 based upon material published in "Highway Capacity Manual", National Academy of Sciences, 1965.

For signalized and unsignalized intersections, level of service is defined in terms of **delay**, a measure of driver discomfort, frustration, fuel consumption and lost travel time. **Table 2-2** summarizes the delay associated with each LOS category:

Table 2-2: Signalized and Unsignalized Intersection Level of Service Criteria

Signalized Intersections		Unsignalized Intersections	
Level of Service	Control Delay per Vehicle (sec/veh)	Level of Service	Average Control Delay (sec/veh)
A	≤ 10	A	0 to 10
B	> 10 to ≤ 20	B	> 10 to ≤ 15
C	> 20 to ≤ 35	C	> 15 to ≤ 25
D	> 35 to ≤ 55	D	> 25 to ≤ 35
E	> 55 to ≤ 80	E	> 35 to ≤ 50
F	> 80	F	> 50

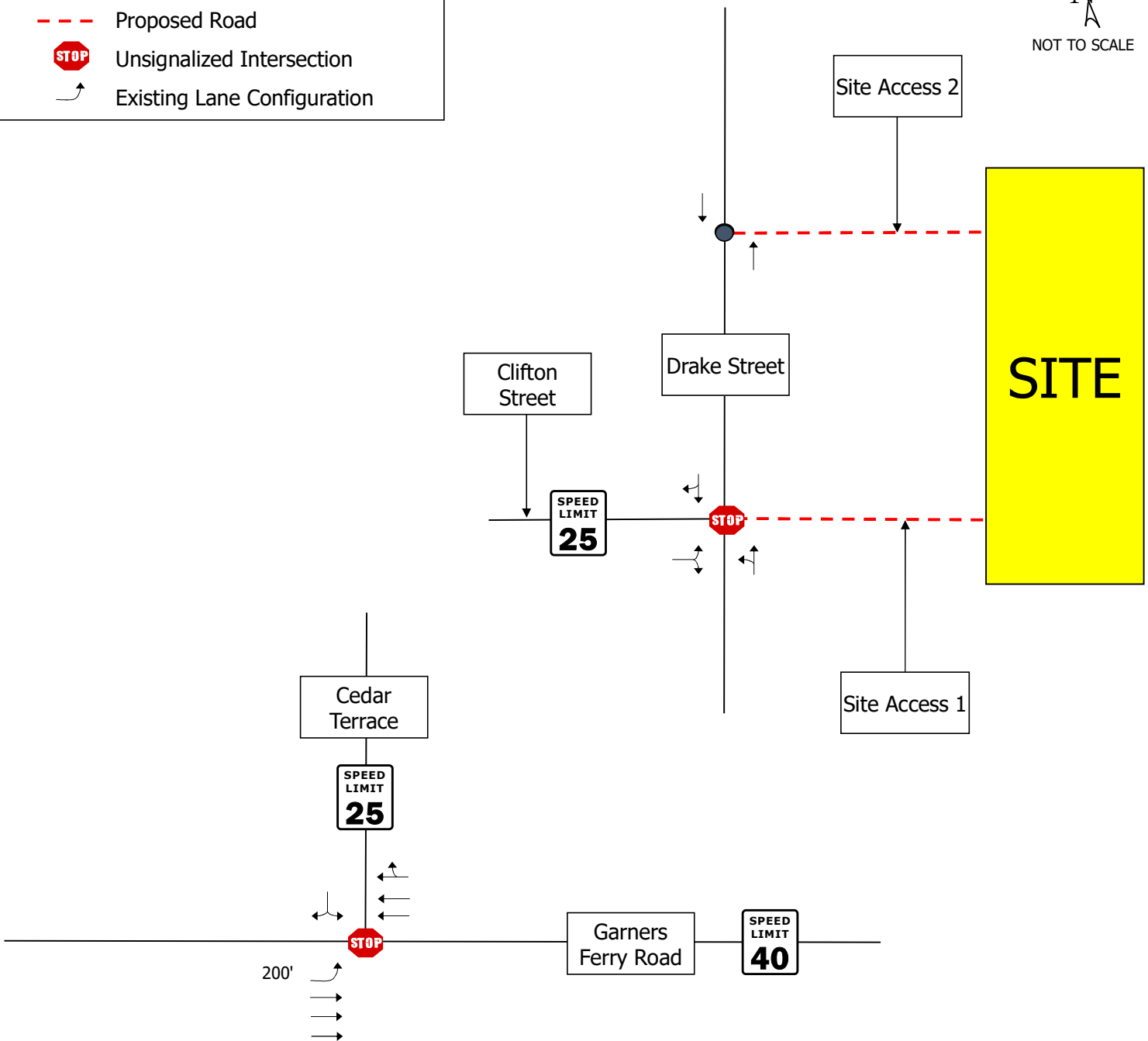
*Source: Exhibit 16-2 and Exhibit 17-2 from
TRB's "Highway Capacity Manual 2000"*

Capacity analyses were performed to assess operational conditions. Study area intersections were analyzed using Synchro Version 10.3 based on Highway Capacity Manual (HCM) methodologies with the following assumptions:

- Existing grades;
- 12-foot lane widths;
- No parking activity, bus stops, or pedestrians;
- Peak hour factor (PHF) of 0.90;
- Heavy vehicle percentages 2%; and
- Minimum turning movement volume of 4 VPH for all allowed movements.

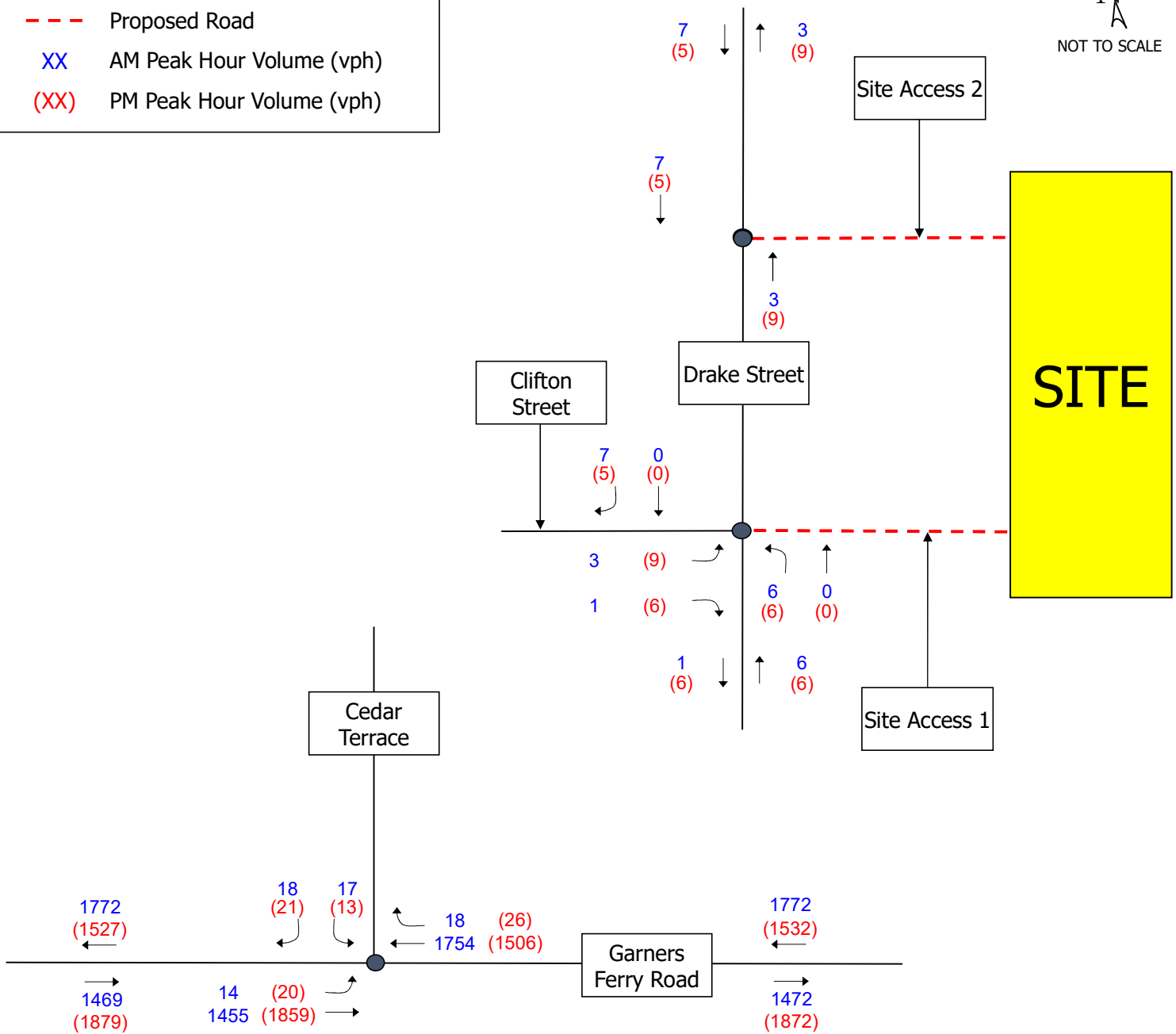
LEGEND:

- Existing Road
- - - Proposed Road
- STOP Unsignalized Intersection
- ↷ Existing Lane Configuration



LEGEND:

- Existing Road
- - - Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)



3 EXISTING AND BACKGROUND CONDITIONS AND ANALYSIS

3.1 2022 EXISTING ANALYSES

Table 3-1 summarizes the 2022 Existing intersection LOS and delay based on the geometry shown in **Figure 2-2** and the 2022 Existing traffic volumes shown in **Figure 2-3**. The corresponding Synchro output is included in **Appendix C**.

The southbound approach of the unsignalized Garners Ferry Road / Cedar Terrace intersection is currently operating at a LOS F during both 2022 Existing peak hours. All other approaches are currently operating at a LOS A during both 2022 Existing peak hours.

All Drake Street / Clifton Street unsignalized intersection approaches are currently operating at a LOS A during both 2022 Existing peak hours.

**Table 3-1: Intersection Level of Service and Delay Summary
2022 Existing Traffic Volumes**

Intersection	Movement and Approach	AM PEAK HOUR		PM PEAK HOUR	
		Delay ¹ (sec/veh)	LOS ¹	Delay ¹ (sec/veh)	LOS ¹
1: Garners Ferry Road & Cedar Terrace Street	EB Approach	0.3	A	0.3	A
	WB Approach	0.0	A	0.0	A
	SB Approach	125.2	F	79.0	F
2: Drake Street & Clifton Street	EB Approach	6.8	A	6.9	A
	NB Approach	7.1	A	7.2	A
	SB Approach	6.6	A	6.7	A
	Overall	6.8	A	6.9	A

¹ Overall intersection LOS and delay not reported for TWSC intersections.

3.2 2023 BACKGROUND TRAFFIC VOLUMES

Figure 3-1 shows the 2023 Ambient traffic volumes calculated using a 2% growth rate for one (1) year.

Per conversations with the City of Columbia, there are two (2) developments assumed to be fully built out by 2023: Murphy Express gas station and the VA Hospital Expansion (see **Appendix D**). Listed below are the approved developments, site trip distribution assumptions, and proposed offsite improvements.

- Murphy Express
 - No TIA provided
 - Located off Garners Ferry Road southeast of the subject development
 - Gas station (assumed 16 vehicle fueling positions based on site visit).
 - Building gross floor area assumed to be approximately 2,600 SF based on adjacent Murphy Express gas stations
 - Trips calculated using the 11th Edition of the Institute of Transportation Engineers (ITE) *Trip Generation Manual*
 - Land Use Code 945
 - Pass-By rates of 76% AM / 75% PM were used per ITE standards
 - Based on existing traffic patterns, it is anticipated that approximately 40% of trips generated will traverse the study area (see **Appendix D**)
 - No assumed offsite intersection improvements

- VA Expansion
 - No TIA provided
 - Located off Garners Ferry Road southwest of the subject development
 - 62,500 SF of Medical-Office space
 - Trips calculated using the 11th Edition of the Institute of Transportation Engineers (ITE) *Trip Generation Manual*
 - Land Use Code 720
 - Based on existing traffic patterns, it is anticipated that approximately 40% of trips generated will traverse the study area (see **Appendix D**)
 - No assumed offsite intersection improvements

2023 projected and distributed trips from the approved developments (see **Appendix D**) were totaled and are found in **Figure 3-2**. The 2023 ambient traffic volumes were added to the approved development traffic volumes to calculate the 2023 Background traffic volumes (**Figure 3-3**).

3.3 2023 BACKGROUND ANALYSIS

Table 3-2 summarizes the intersection LOS and delay based on the geometry shown in **Figure 2-2** and the 2023 Background traffic volumes shown in **Figure 3-3**. The corresponding Synchro output is included in **Appendix C**.

The southbound approach of the unsignalized Garners Ferry Road / Cedar Terrace intersection is projected to operate at a LOS F during both 2023 Background peak hours. All other approaches are projected to operate at a LOS A during both 2023 Background peak hours.

All Drake Street / Clifton Street unsignalized intersection approaches are projected to operate at a LOS A during both 2023 Background peak hours.

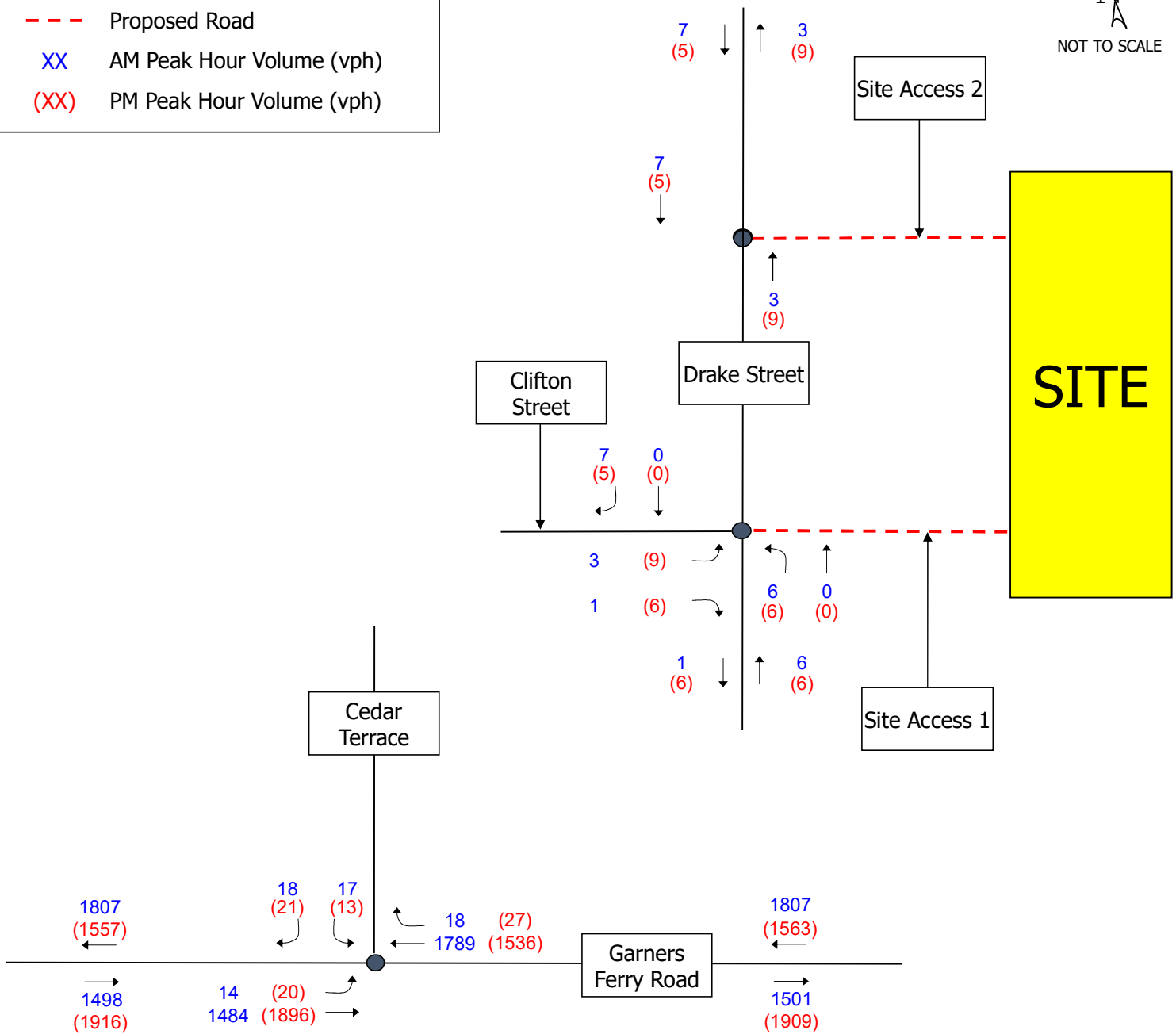
**Table 3-2: Intersection Level of Service and Delay Summary
2023 Background Traffic Volumes**

Intersection	Movement and Approach	AM PEAK HOUR		PM PEAK HOUR	
		Delay ¹ (sec/veh)	LOS ¹	Delay ¹ (sec/veh)	LOS ¹
1: Garners Ferry Road & Cedar Terrace Street	EB Approach	0.4	A	0.3	A
	WB Approach	0.0	A	0.0	A
	SB Approach	163.2	F	102.8	F
2: Drake Street & Clifton Street	EB Approach	6.8	A	6.9	A
	NB Approach	7.1	A	7.2	A
	SB Approach	6.6	A	6.7	A
	Overall	6.8	A	6.9	A

¹ Overall intersection LOS and delay not reported for TWSC intersections.

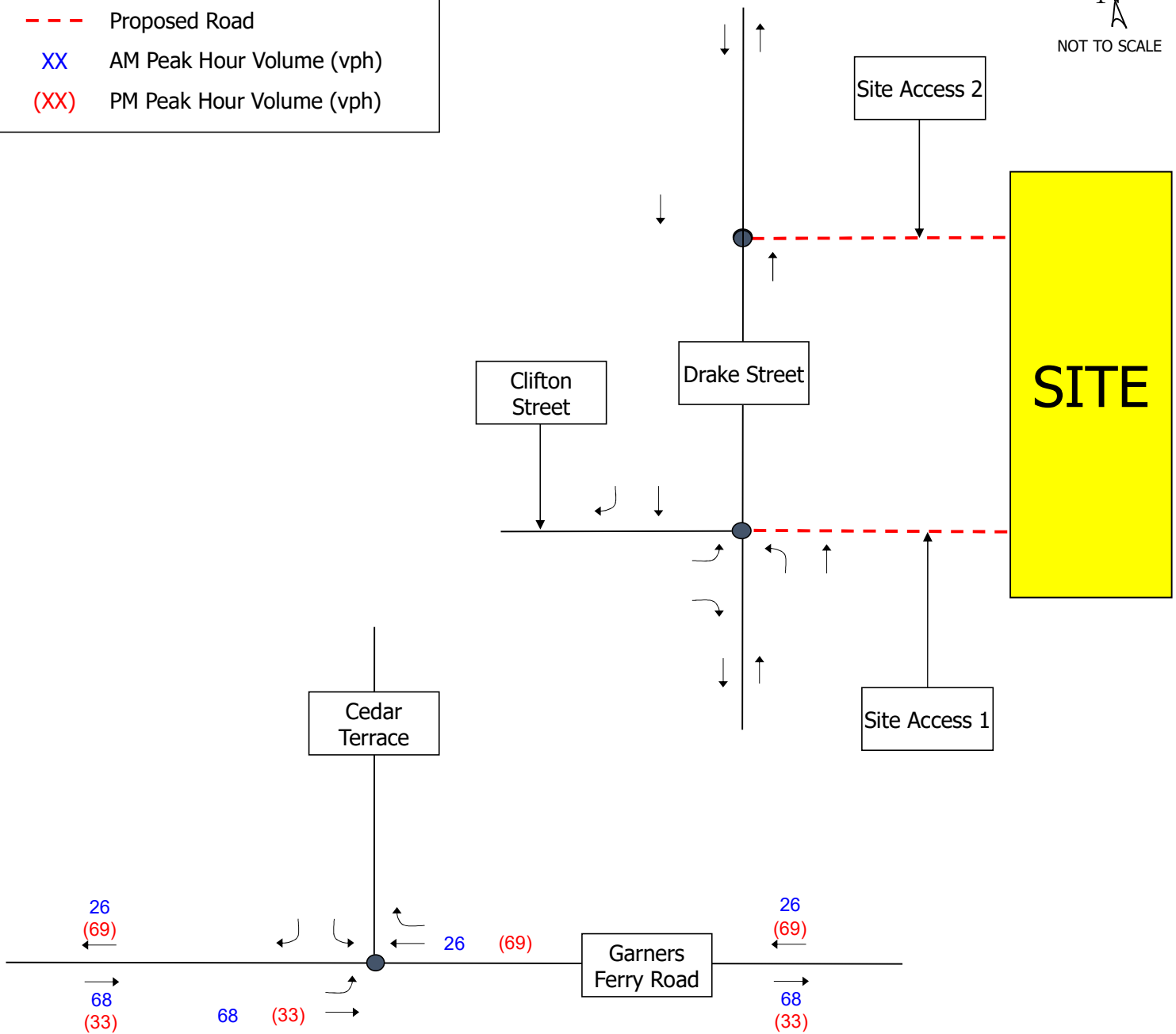
LEGEND:

- Existing Road
- - - Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)



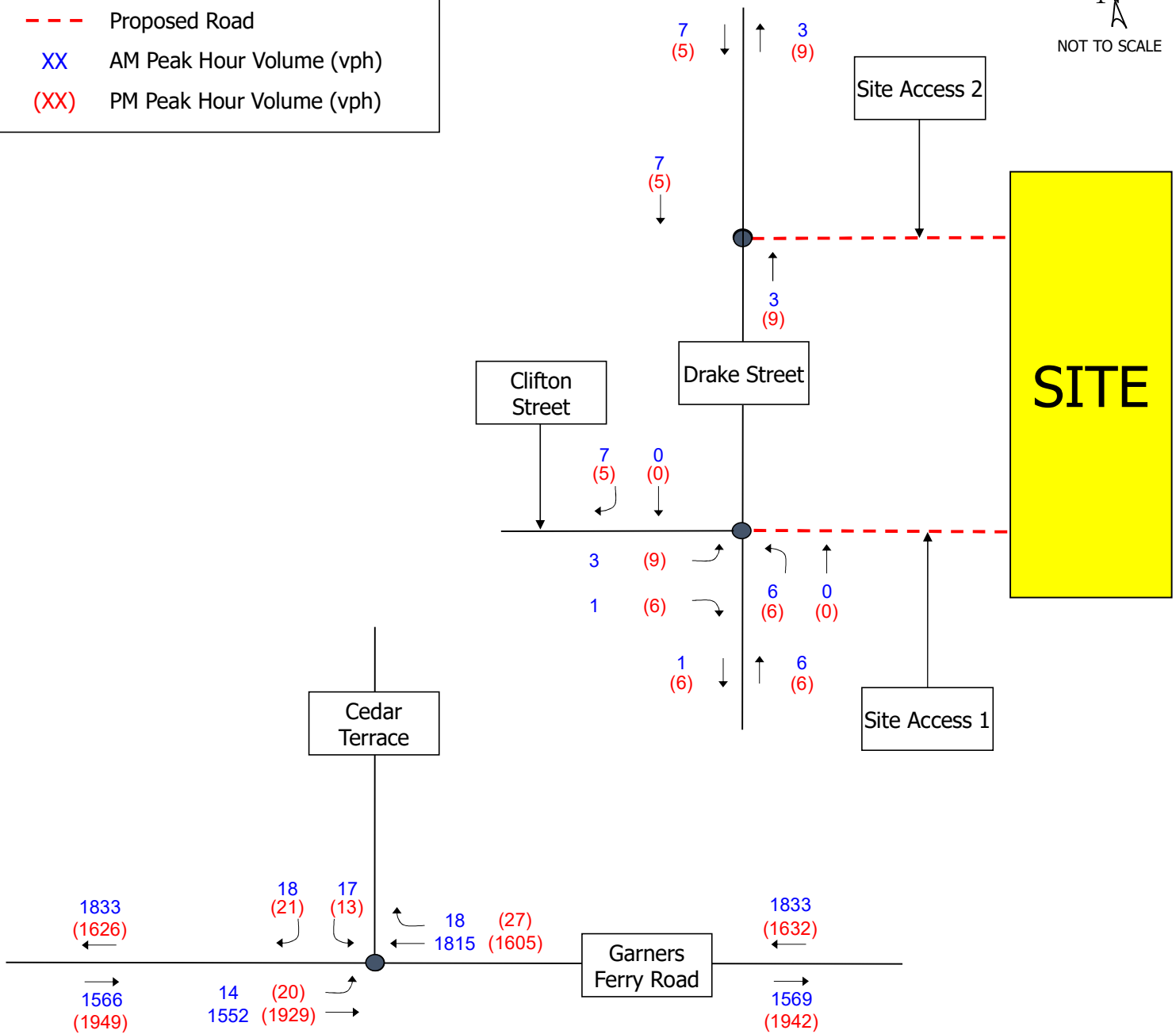
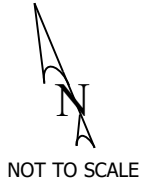
LEGEND:

- Existing Road
- - - Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)



LEGEND:

- Existing Road
- - - Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)



4 SITE TRIP GENERATION AND DISTRIBUTION

Proposed development site trips were estimated based on the proposed land uses supplied by the developer and subsequently distributed onto the surrounding roadway network.

4.1 TRIP GENERATION

The site-generated trips shown in **Table 4-1** are based on trip generation information provided in the 11th Edition of the Institute of Transportation Engineers (ITE) *Trip Generation Manual* and the anticipated development size. The trip generation was calculated using the proposed number of residential units as the independent variable. The “Peak Hour of Generator” and “Fitted Curve” were used to calculate trips as that combination resulted in the highest number of trips; thus, representing a worst-case scenario from a traffic generation perspective.

Table 4-1: Trip Generation Summary

ITE Land Use Code	Independent Variable	ADT	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
220- Multifamily Housing (Low-Rise)	150 Units	1,037	19	62	81	61	37	98

SOURCE: Institute of Transportation Engineers' *Trip Generation Manual* 11th Edition (2021)

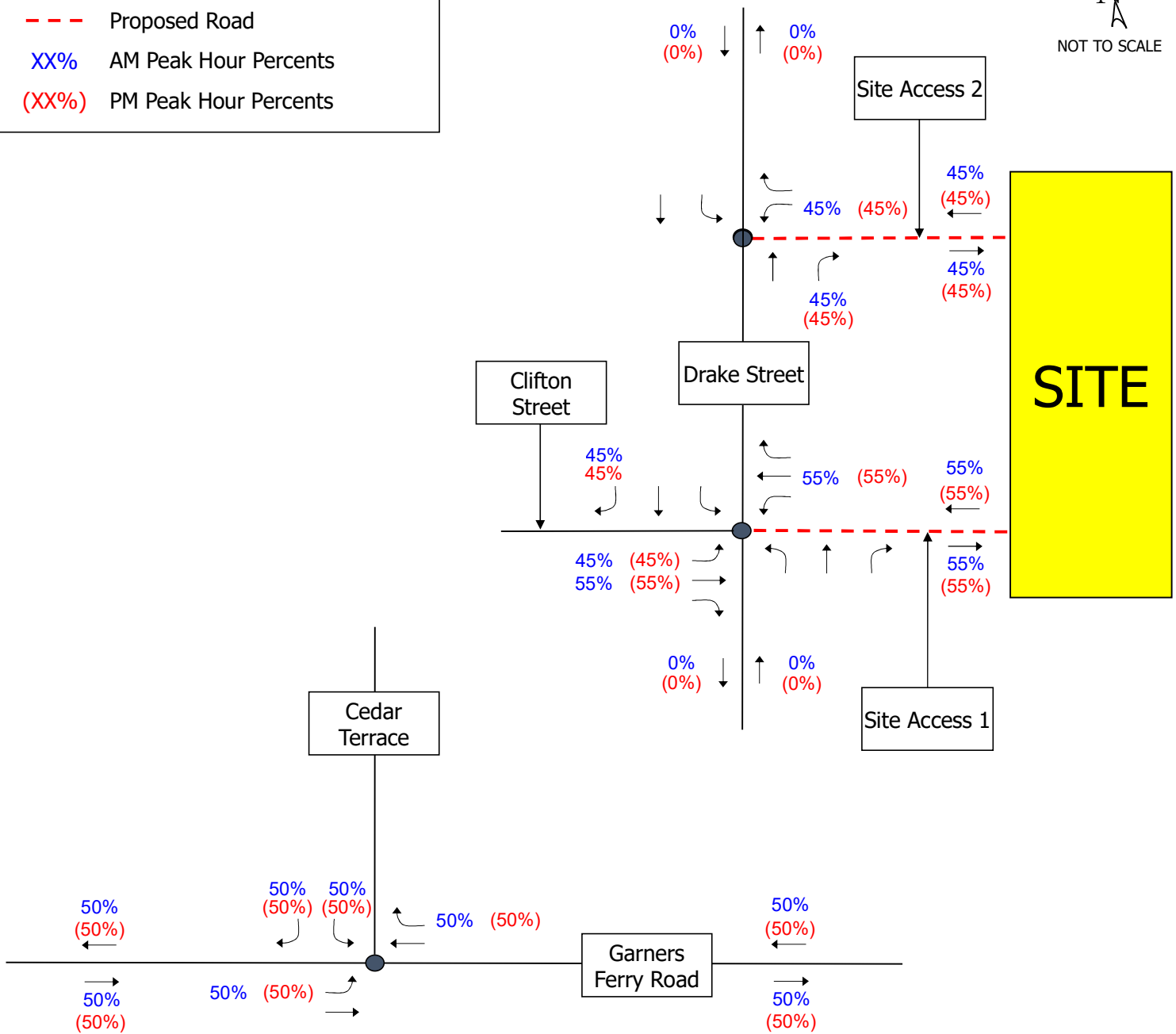
AM peak hour trips totaled 19 incoming and 62 outgoing where PM peak hour trips totaled 61 incoming and 37 outgoing. Average Daily Traffic (ADT) volumes generated by the development totaled 1,037 VPD. No reduction in trips were included due to internal capture or pass-by trips.

4.2 TRIP DISTRIBUTION

The directional traffic patterns, or trip distribution, of the site-generated traffic was determined using the existing traffic characteristics and engineering judgement. It was assumed, for purposes of this study, that all site traffic would enter and exit the study area in a similar manner as the existing traffic. Area trip distribution is based on traffic counts performed by Timmons Group. Total trips into and out of the study area using Garners Ferry Road form the basis for the percentage distribution. The percentages were routed, via shortest path, to and from the proposed development. The distribution percentages were then applied to the generated trips to predict routes and project traffic volumes for the 2023 Build scenario. Trip distribution percentages are shown in **Figure 4-1** and trip distribution volumes are shown in **Figure 4-2**.

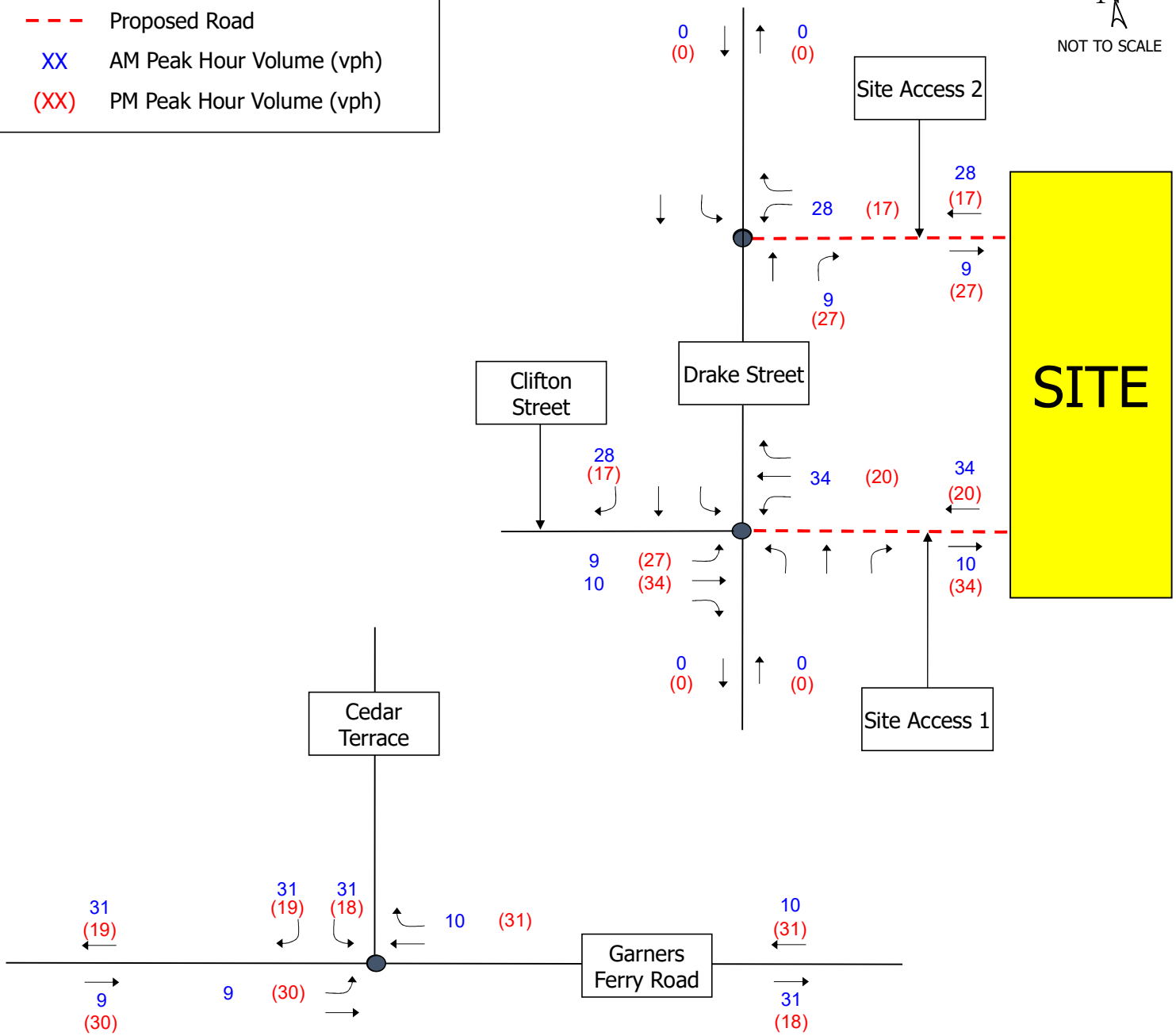
LEGEND:

- Existing Road
- - - Proposed Road
- XX% AM Peak Hour Percents
- (XX%) PM Peak Hour Percents



LEGEND:

- Existing Road
- - - Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)



5 2023 BUILD CONDITION AND ANALYSIS

To complete the 2023 Build analyses (including proposed development), the estimated site trips were added to the 2023 Background traffic volumes. The projected total volumes, along with the existing intersection geometry, were used to complete the capacity analyses.

To summarize, the 2023 Build traffic volumes shown in **Figure 5-1** contain the following:

- 2023 Background traffic volumes (**Figure 3-3**); and
- Site trips generated by the subject development (**Figure 4-2**).

5.1 2023 BUILD ANALYSIS

Table 5-1 summarizes the intersection LOS and delay based on the geometry shown in **Figure 2-2** and the 2023 Build traffic volumes shown in **Figure 5-1**. The corresponding Synchro output is included in **Appendix C**.

The southbound approach of the unsignalized Garners Ferry Road / Cedar Terrace intersection is projected to operate at a LOS F during both 2023 Build peak hours. All other approaches are projected to operate at a LOS A during both 2023 peak hours. Other than signalization, no amount of feasible geometric improvements will result in the southbound approach operating acceptably. Based on the side street volumes it is unlikely that the subject intersection will meet the MUTCD's 4-hour and 8-hour volume warrants; therefore, signalization is not recommended. Any widening along the southbound approach would likely require obtaining substantial right-of-way and would impact the viability of the adjacent business. Additionally, the widening of Cedar Terrace would likely require the relocation of utilities. Based on aerial imagery, southbound vehicles have several options (i.e. Brandon Avenue and Munsen Spring Drive) to access Garner Ferrys Road should significant delay occur at the Garners Ferry Road / Cedar Terrace intersection. Finally, the adjacent signals will provide gaps in traffic to accommodate southbound vehicles. No improvements are recommended due to the construction of the subject development.

All Drake Street / Clifton Street / Site Access 1 unsignalized intersection approaches are projected to operate at a LOS A during both 2023 Build peak hours. As described in **Section 2**, this intersection was analyzed as an all-way Stop Control intersection. The developer should coordinate with the City to ensure proper intersection control signage at this location. No geometric improvements are recommended due to the construction of the subject development.

All Drake Street / Site Access 2 unsignalized intersection approaches are projected to operate at a LOS A during both 2023 Build peak hours. No improvements are recommended due to the construction of the subject development.

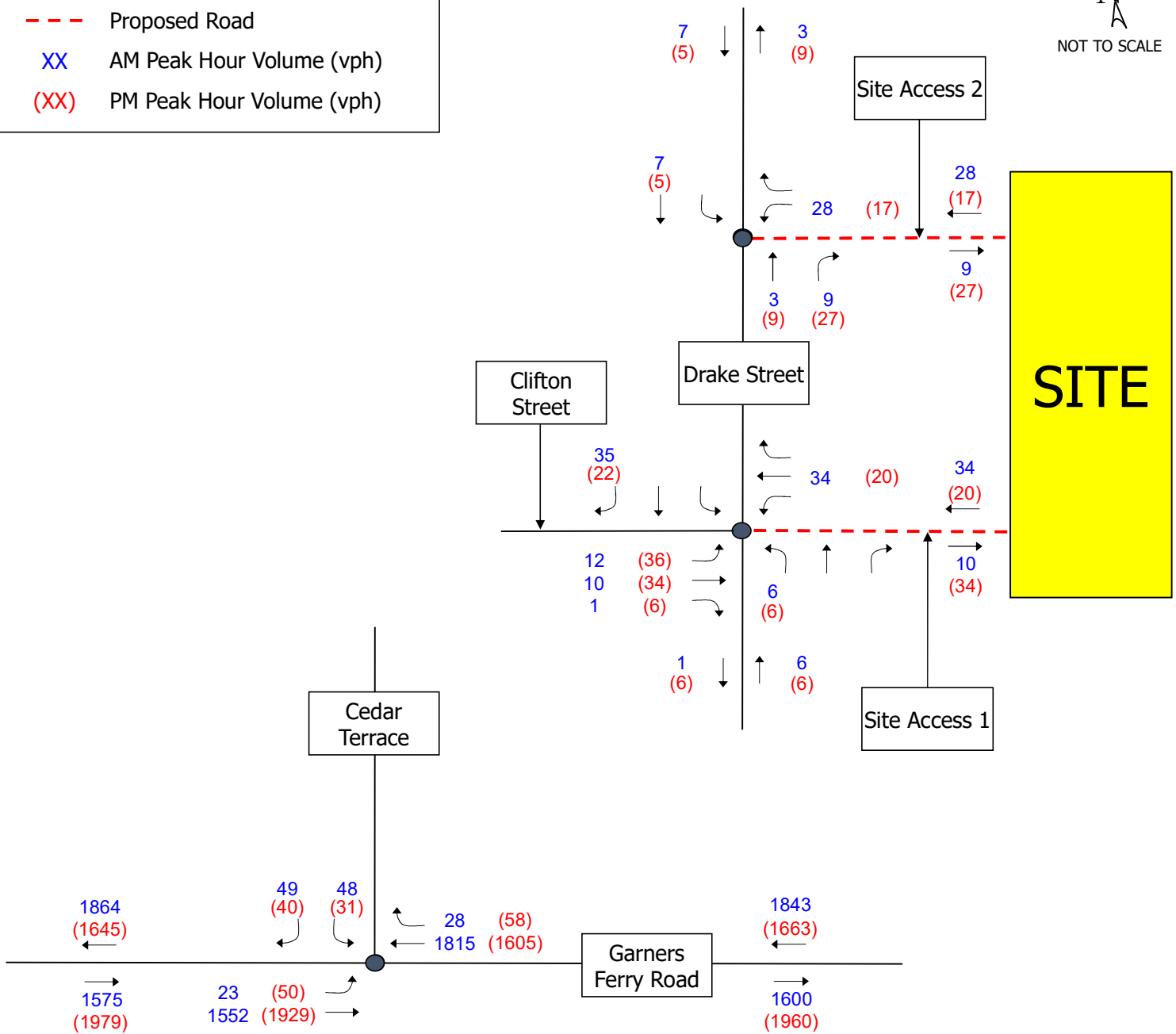
**Table 5-1: Intersection Level of Service and Delay Summary
2023 Build Traffic Volumes**

Intersection	Movement and Approach	AM PEAK HOUR		PM PEAK HOUR	
		Delay ¹ (sec/veh)	LOS ¹	Delay ¹ (sec/veh)	LOS ¹
1: Garners Ferry Road & Ceder Terrace Street	EB Approach	0.6	A	1.1	A
	WB Approach	0.0	A	0.0	A
	SB Approach	753.0	F	557.5	F
2: Drake Street & Clifton Street / Site Access 1	EB Approach	7.2	A	7.6	A
	WB Approach	7.3	A	7.2	A
	NB Approach	7.1	A	7.2	A
	SB Approach	6.8	A	6.9	A
	Overall	7.1	A	7.3	A
3: Drake Street & Site Access 2	WB Approach	8.7	A	8.7	A
	NB Approach	0.0	A	0.0	A
	SB Approach	2.6	A	3.2	A

¹ Overall intersection LOS and delay not reported for TWSC intersections.

LEGEND:

- Existing Road
- - - Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)



6 CONCLUSIONS AND RECOMMENDATIONS

Capacity analyses were performed for the following scenarios:

- 2022 Existing traffic volumes
- 2023 Background traffic volumes
- 2023 Build traffic volumes (Background + site trips)

In closing, no improvements are recommended in conjunction with the construction of the proposed development.

Appendix A – Scoping Information

Cliff Lawson

From: Brewer, David D <David.Brewer@columbiasc.gov>
Sent: Friday, August 12, 2022 6:58 AM
To: Cliff Lawson
Cc: Jeff Hochanadel
Subject: Re: [EXTERNAL] 1002 Drake Street (Drake Street Residential) TIA

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

The standards in the SCDOT ARMS manual will be fine for the TIA.

From: Cliff Lawson <Cliff.Lawson@timmons.com>
Sent: Thursday, August 11, 2022 5:01 PM
To: Brewer, David D
Cc: Jeff Hochanadel
Subject: [EXTERNAL] 1002 Drake Street (Drake Street Residential) TIA

CAUTION: This email originated outside of the organization. Do not click links or open attachments from unknown senders or suspicious emails. Never enter a username or password on a site that you did not knowingly access.

Mr. Brewer,

Thanks for taking the time to meet with us today. Below is an outline of what was discussed in today's meeting. Hopefully this will suffice for scoping purposes. Please comment as you see fit.

- Building Program: 150 multi-family units → Trips will be generated per the ITE Trip Generation Manual, 11th Edition
- Build-out Year: 2023
- Study Area Intersections:
 - Garners Ferry Road / Cedar Terrace
 - Drake Street / Clifton Street / Site Access 1
 - Drake Street / Site Access 2 → After discussing internally, it was determined that Site Access 2 will be approximately 150-feet south of Norris Street so SCDOT will not need to be involved.
- Counts to be conducted the week of August 23rd
 - Either Tuesday, Wednesday, or Thursday
 - 7-9am and 4-6 pm
- Approved Developments: Assumed none → Will confirm with Planning & Development Services
- Public Improvement Projects: None
- Growth Rate: 2% (Per Garner Ferry Road Historical AADTs)

Also, I was not able to locate any TIA standards for the City. Are there any available or should I just refer to the ARMS manual?

Thanks,

Cliff Lawson, PE, PTOE
Senior Project Manager

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Office: 919.866.4946 | Fax: 704.376.1076

Cliff.Lawson@timmons.com

Your Vision Achieved Through Ours

To send me files greater than 20MB [click here](#).

Appendix B – Traffic Counts



File Name : Columbia(Drake Street and Clifton Street)1267
Site Code :
Start Date : 8/23/2022
Page No : 1

Groups Printed- Cars + - Trucks

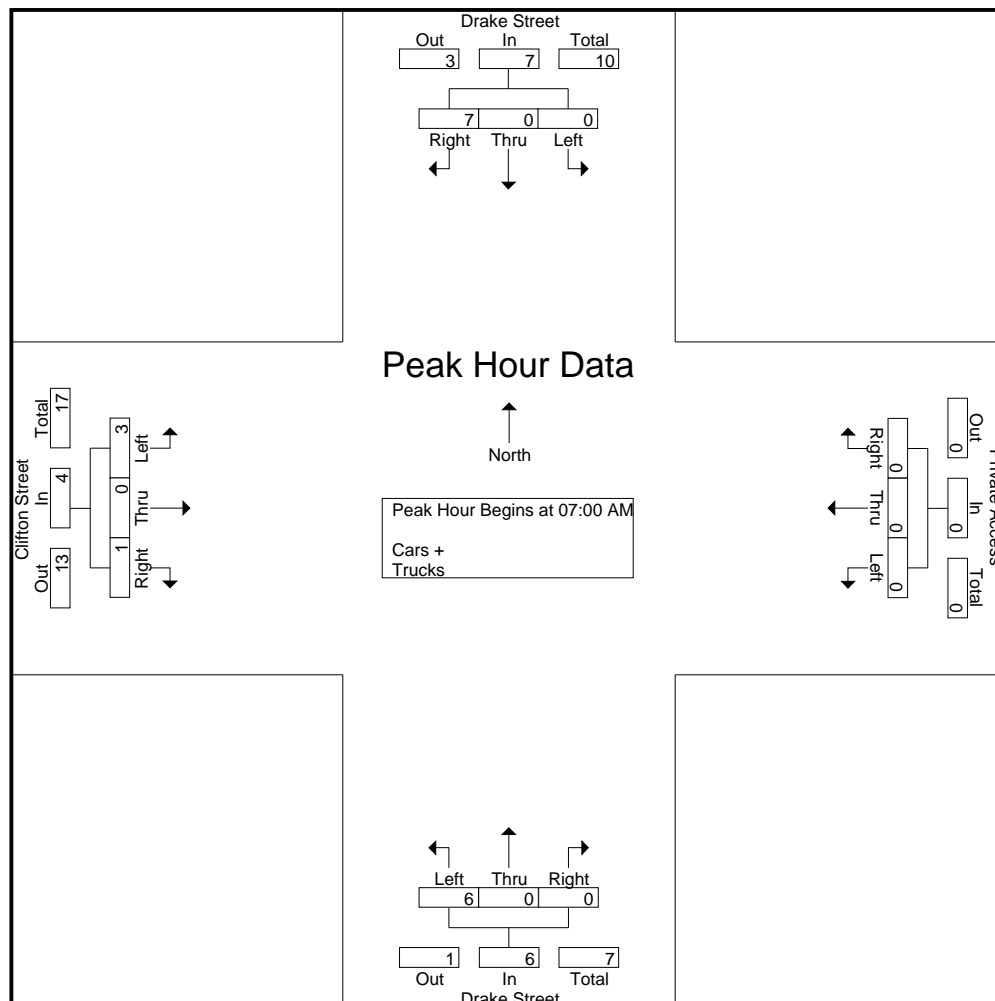
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TRAFFIC DATA COLLECTION

File Name : Columbia(Drake Street and Clifton Street)1267
 Site Code :
 Start Date : 8/23/2022
 Page No : 2

	Drake Street Southbound				Private Access Westbound				Drake Street Northbound				Clifton Street Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	3	0	0	3	0	0	0	0	0	0	2	2	0	0	0	0	5
07:15 AM	2	0	0	2	0	0	0	0	0	0	1	1	0	0	1	1	4
07:30 AM	1	0	0	1	0	0	0	0	0	0	1	1	0	0	2	2	4
07:45 AM	1	0	0	1	0	0	0	0	0	0	2	2	1	0	0	1	4
Total Volume	7	0	0	7	0	0	0	0	0	0	6	6	1	0	3	4	17
% App. Total	100	0	0		0	0	0		0	0	100		25	0	75		
PHF	.583	.000	.000	.583	.000	.000	.000	.000	.000	.000	.750	.750	.250	.000	.375	.500	.850





File Name : Columbia(Drake Street and Clifton Street)1267
Site Code :
Start Date : 8/23/2022
Page No : 1

Groups Printed- Cars + - Trucks

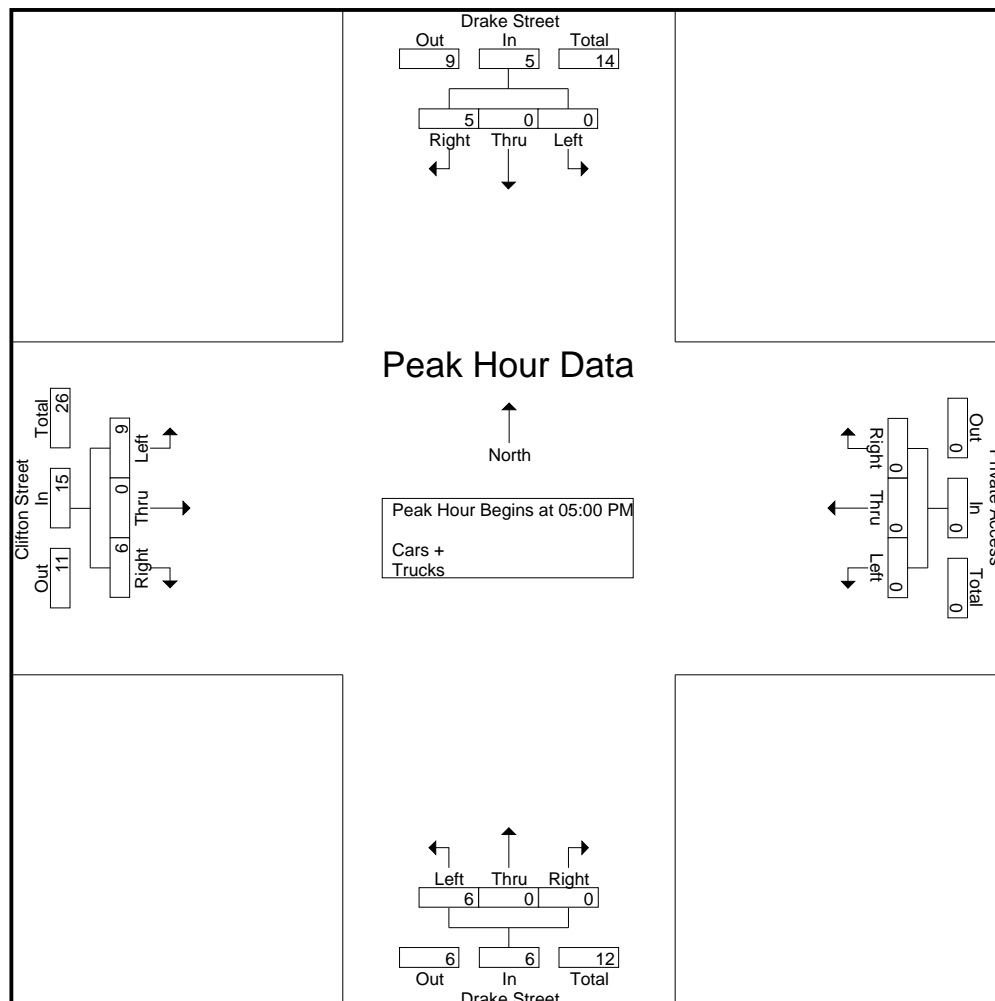
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TRAFFIC DATA COLLECTION

File Name : Columbia(Drake Street and Clifton Street)1267
 Site Code :
 Start Date : 8/23/2022
 Page No : 2

	Drake Street Southbound				Private Access Westbound				Drake Street Northbound				Clifton Street Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	0	0	0	0	0	0	0	0	2	2	1	0	2	3	5
05:15 PM	3	0	0	3	0	0	0	0	0	0	1	1	3	0	2	5	9
05:30 PM	1	0	0	1	0	0	0	0	0	0	3	3	1	0	1	2	6
05:45 PM	1	0	0	1	0	0	0	0	0	0	0	0	1	0	4	5	6
Total Volume	5	0	0	5	0	0	0	0	0	0	6	6	6	0	9	15	26
% App. Total	100	0	0		0	0	0		0	0	100		40	0	60		
PHF	.417	.000	.000	.417	.000	.000	.000	.000	.000	.000	.500	.500	.500	.000	.563	.750	.722





TRAFFIC DATA COLLECTION

File Name : Columbia(Garners Ferry and Cedar Terrace)1190
 Site Code :
 Start Date : 8/23/2022
 Page No : 1

Groups Printed- Cars + - Trucks

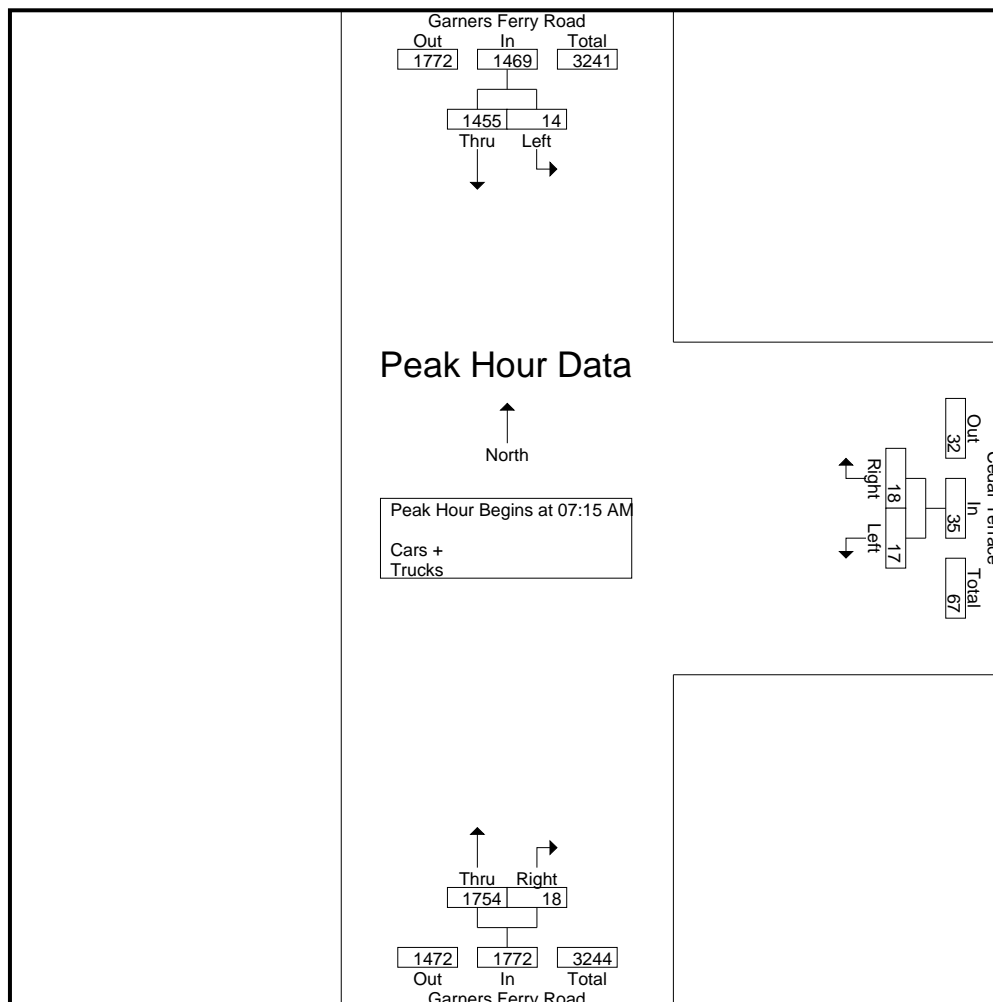
	Garners Ferry Road Southbound			Cedar Terrace Westbound			Garners Ferry Road Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
07:00 AM	234	4	238	10	3	13	0	387	387	638
07:15 AM	353	2	355	6	4	10	3	455	458	823
07:30 AM	397	5	402	1	7	8	3	458	461	871
07:45 AM	390	3	393	7	3	10	5	453	458	861
Total	1374	14	1388	24	17	41	11	1753	1764	3193
08:00 AM	315	4	319	4	3	7	7	388	395	721
08:15 AM	277	0	277	4	3	7	4	431	435	719
08:30 AM	237	1	238	8	3	11	4	358	362	611
08:45 AM	239	0	239	2	3	5	5	362	367	611
Total	1068	5	1073	18	12	30	20	1539	1559	2662
Grand Total	2442	19	2461	42	29	71	31	3292	3323	5855
Apprch %	99.2	0.8		59.2	40.8		0.9	99.1		
Total %	41.7	0.3	42	0.7	0.5	1.2	0.5	56.2	56.8	
Cars +	2379	18	2397	42	28	70	30	3239	3269	5736
% Cars +	97.4	94.7	97.4	100	96.6	98.6	96.8	98.4	98.4	98
Trucks	63	1	64	0	1	1	1	53	54	119
% Trucks	2.6	5.3	2.6	0	3.4	1.4	3.2	1.6	1.6	2



TRAFFIC DATA COLLECTION

File Name : Columbia(Garners Ferry and Cedar Terrace)1190
 Site Code :
 Start Date : 8/23/2022
 Page No : 2

	Garners Ferry Road Southbound			Cedar Terrace Westbound			Garners Ferry Road Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	353	2	355	6	4	10	3	455	458	823
07:30 AM	397	5	402	1	7	8	3	458	461	871
07:45 AM	390	3	393	7	3	10	5	453	458	861
08:00 AM	315	4	319	4	3	7	7	388	395	721
Total Volume	1455	14	1469	18	17	35	18	1754	1772	3276
% App. Total	99	1		51.4	48.6		1	99		
PHF	.916	.700	.914	.643	.607	.875	.643	.957	.961	.940





TRAFFIC DATA COLLECTION

File Name : Columbia(Garners Ferry and Cedar Terrace)1190
 Site Code :
 Start Date : 8/23/2022
 Page No : 1

Groups Printed- Cars + - Trucks

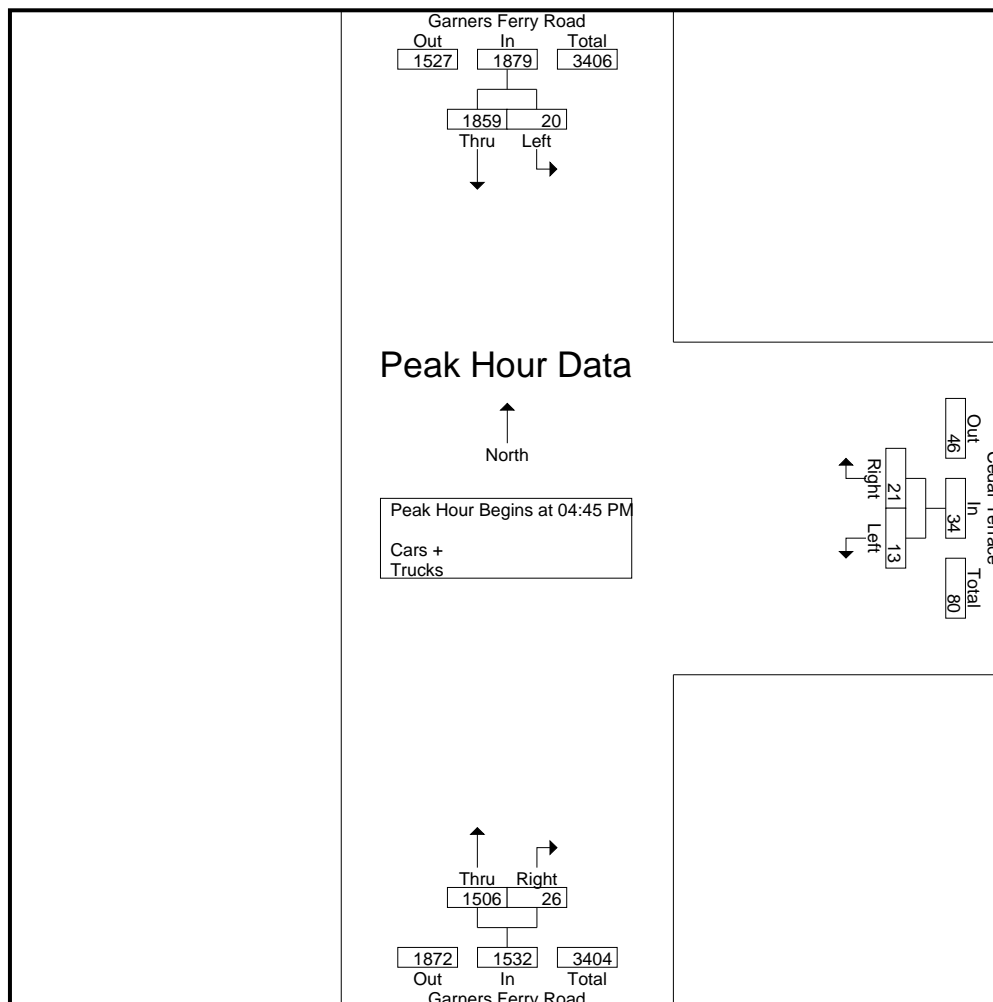
	Garners Ferry Road Southbound			Cedar Terrace Westbound			Garners Ferry Road Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
04:00 PM	425	2	427	5	3	8	5	392	397	832
04:15 PM	418	3	421	8	6	14	7	388	395	830
04:30 PM	443	6	449	7	6	13	6	406	412	874
04:45 PM	446	4	450	3	3	6	5	374	379	835
Total	1732	15	1747	23	18	41	23	1560	1583	3371
05:00 PM	449	8	457	3	3	6	3	401	404	867
05:15 PM	473	3	476	7	7	14	10	339	349	839
05:30 PM	491	5	496	8	0	8	8	392	400	904
05:45 PM	425	10	435	9	3	12	6	335	341	788
Total	1838	26	1864	27	13	40	27	1467	1494	3398
Grand Total	3570	41	3611	50	31	81	50	3027	3077	6769
Apprch %	98.9	1.1		61.7	38.3		1.6	98.4		
Total %	52.7	0.6	53.3	0.7	0.5	1.2	0.7	44.7	45.5	
Cars +	3531	41	3572	50	31	81	49	2999	3048	6701
% Cars +	98.9	100	98.9	100	100	100	98	99.1	99.1	99
Trucks	39	0	39	0	0	0	1	28	29	68
% Trucks	1.1	0	1.1	0	0	0	2	0.9	0.9	1



TRAFFIC DATA COLLECTION

File Name : Columbia(Garners Ferry and Cedar Terrace)1190
 Site Code :
 Start Date : 8/23/2022
 Page No : 2

	Garners Ferry Road Southbound			Cedar Terrace Westbound			Garners Ferry Road Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	446	4	450	3	3	6	5	374	379	835
05:00 PM	449	8	457	3	3	6	3	401	404	867
05:15 PM	473	3	476	7	7	14	10	339	349	839
05:30 PM	491	5	496	8	0	8	8	392	400	904
Total Volume	1859	20	1879	21	13	34	26	1506	1532	3445
% App. Total	98.9	1.1		61.8	38.2		1.7	98.3		
PHF	.947	.625	.947	.656	.464	.607	.650	.939	.948	.953









Appendix C – Synchro Analysis Outputs

2022 Existing Traffic Volumes

Drake Street TIA
1: Garners Ferry Road & Ceder Terrace Street

08/31/2022

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	1455	1754	18	17	18
Future Vol, veh/h	14	1455	1754	18	17	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	1617	1949	20	19	20

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	1969	0	0 2638 985
Stage 1	-	-	- 1959 -
Stage 2	-	-	- 679 -
Critical Hdwy	5.34	-	- 5.74 7.14
Critical Hdwy Stg 1	-	-	- 6.64 -
Critical Hdwy Stg 2	-	-	- 6.04 -
Follow-up Hdwy	3.12	-	- 3.82 3.92
Pot Cap-1 Maneuver	130	-	- 42 212
Stage 1	-	-	- 60 -
Stage 2	-	-	- 423 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	130	-	- 37 212
Mov Cap-2 Maneuver	-	-	- 37 -
Stage 1	-	-	- 53 -
Stage 2	-	-	- 423 -

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	125.2
HCM LOS			F




Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	130	-	-	-	64
HCM Lane V/C Ratio	0.12	-	-	-	0.608
HCM Control Delay (s)	36.4	-	-	-	125.2
HCM Lane LOS	E	-	-	-	F
HCM 95th %tile Q(veh)	0.4	-	-	-	2.6

Drake Street TIA
2: Drake Street & Clifton Street

08/31/2022

Intersection

Intersection Delay, s/veh	6.8
Intersection LOS	A







Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	4	6	4	4	7
Future Vol, veh/h	4	4	6	4	4	7
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	4	7	4	4	8
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	6.8	7.1	6.6
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	60%	50%	0%
Vol Thru, %	40%	0%	36%
Vol Right, %	0%	50%	64%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	10	8	11
LT Vol	6	4	0
Through Vol	4	0	4
RT Vol	0	4	7
Lane Flow Rate	11	9	12
Geometry Grp	1	1	1
Degree of Util (X)	0.013	0.009	0.012
Departure Headway (Hd)	4.079	3.775	3.576
Convergence, Y/N	Yes	Yes	Yes
Cap	882	952	1006
Service Time	2.082	1.783	1.581
HCM Lane V/C Ratio	0.012	0.009	0.012
HCM Control Delay	7.1	6.8	6.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0	0

Drake Street TIA
1: Garners Ferry Road & Ceder Terrace Street

08/31/2022

Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	1859	1506	26	13	21
Future Vol, veh/h	20	1859	1506	26	13	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	2066	1673	29	14	23

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	1702	0	0 2558 851
Stage 1	-	-	- 1688 -
Stage 2	-	-	- 870 -
Critical Hdwy	5.34	-	- 5.74 7.14
Critical Hdwy Stg 1	-	-	- 6.64 -
Critical Hdwy Stg 2	-	-	- 6.04 -
Follow-up Hdwy	3.12	-	- 3.82 3.92
Pot Cap-1 Maneuver	177	-	- 46 260
Stage 1	-	-	- 90 -
Stage 2	-	-	- 335 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	177	-	- 40 260
Mov Cap-2 Maneuver	-	-	- 40 -
Stage 1	-	-	- 79 -
Stage 2	-	-	- 335 -

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	79
HCM LOS			F




Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	177	-	-	-	84
HCM Lane V/C Ratio	0.126	-	-	-	0.45
HCM Control Delay (s)	28.2	-	-	-	79
HCM Lane LOS	D	-	-	-	F
HCM 95th %tile Q(veh)	0.4	-	-	-	1.9

Drake Street TIA
2: Drake Street & Clifton Street

08/31/2022

Intersection

Intersection Delay, s/veh	6.9
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	6	6	4	4	5
Future Vol, veh/h	9	6	6	4	4	5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	7	7	4	4	6
Number of Lanes	1	0	0	1	1	0







Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	6.9	7.2	6.7
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	60%	60%	0%
Vol Thru, %	40%	0%	44%
Vol Right, %	0%	40%	56%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	10	15	9
LT Vol	6	9	0
Through Vol	4	0	4
RT Vol	0	6	5
Lane Flow Rate	11	17	10
Geometry Grp	1	1	1
Degree of Util (X)	0.013	0.018	0.01
Departure Headway (Hd)	4.091	3.851	3.639
Convergence, Y/N	Yes	Yes	Yes
Cap	879	933	987
Service Time	2.098	1.859	1.647
HCM Lane V/C Ratio	0.013	0.018	0.01
HCM Control Delay	7.2	6.9	6.7
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.1	0

2023 Background Traffic Volumes

Drake Street TIA
1: Garners Ferry Road & Ceder Terrace Street

09/06/2022

Intersection						
Int Delay, s/veh	1.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	1552	1815	18	17	18
Future Vol, veh/h	14	1552	1815	18	17	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	1724	2017	20	19	20

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	2037	0	0 2749 1019
Stage 1	-	-	- 2027 -
Stage 2	-	-	- 722 -
Critical Hdwy	5.34	-	- 5.74 7.14
Critical Hdwy Stg 1	-	-	- 6.64 -
Critical Hdwy Stg 2	-	-	- 6.04 -
Follow-up Hdwy	3.12	-	- 3.82 3.92
Pot Cap-1 Maneuver	120	-	- 36 201
Stage 1	-	-	- 55 -
Stage 2	-	-	- 402 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	120	-	- 31 201
Mov Cap-2 Maneuver	-	-	- 31 -
Stage 1	-	-	- 48 -
Stage 2	-	-	- 402 -

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	163.2
HCM LOS			F




Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	120	-	-	-	55
HCM Lane V/C Ratio	0.13	-	-	-	0.707
HCM Control Delay (s)	39.4	-	-	-	163.2
HCM Lane LOS	E	-	-	-	F
HCM 95th %tile Q(veh)	0.4	-	-	-	2.9

Drake Street TIA
2: Drake Street & Clifton Street

09/06/2022

Intersection

Intersection Delay, s/veh	6.8
Intersection LOS	A







Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	4	6	4	4	7
Future Vol, veh/h	4	4	6	4	4	7
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	4	7	4	4	8
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	6.8	7.1	6.6
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	60%	50%	0%
Vol Thru, %	40%	0%	36%
Vol Right, %	0%	50%	64%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	10	8	11
LT Vol	6	4	0
Through Vol	4	0	4
RT Vol	0	4	7
Lane Flow Rate	11	9	12
Geometry Grp	1	1	1
Degree of Util (X)	0.013	0.009	0.012
Departure Headway (Hd)	4.079	3.775	3.576
Convergence, Y/N	Yes	Yes	Yes
Cap	882	952	1006
Service Time	2.082	1.783	1.581
HCM Lane V/C Ratio	0.012	0.009	0.012
HCM Control Delay	7.1	6.8	6.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0	0

Drake Street TIA
1: Garners Ferry Road & Ceder Terrace Street

09/06/2022

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	1929	1605	27	13	21
Future Vol, veh/h	20	1929	1605	27	13	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	2143	1783	30	14	23

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	1813	0	0 2699 907
Stage 1	-	-	- 1798 -
Stage 2	-	-	- 901 -
Critical Hdwy	5.34	-	- 5.74 7.14
Critical Hdwy Stg 1	-	-	- 6.64 -
Critical Hdwy Stg 2	-	-	- 6.04 -
Follow-up Hdwy	3.12	-	- 3.82 3.92
Pot Cap-1 Maneuver	155	-	- 39 239
Stage 1	-	-	- 77 -
Stage 2	-	-	- 323 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	155	-	- 33 239
Mov Cap-2 Maneuver	-	-	- 33 -
Stage 1	-	-	- 66 -
Stage 2	-	-	- 323 -




Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	102.8
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	155	-	-	-	71
HCM Lane V/C Ratio	0.143	-	-	-	0.532
HCM Control Delay (s)	32.1	-	-	-	102.8
HCM Lane LOS	D	-	-	-	F
HCM 95th %tile Q(veh)	0.5	-	-	-	2.2

Drake Street TIA
2: Drake Street & Clifton Street

09/06/2022

Intersection	
Intersection Delay, s/veh	6.9
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	6	6	4	4	5
Future Vol, veh/h	9	6	6	4	4	5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	7	7	4	4	6
Number of Lanes	1	0	0	1	1	0







Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	6.9	7.2	6.7
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	60%	60%	0%
Vol Thru, %	40%	0%	44%
Vol Right, %	0%	40%	56%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	10	15	9
LT Vol	6	9	0
Through Vol	4	0	4
RT Vol	0	6	5
Lane Flow Rate	11	17	10
Geometry Grp	1	1	1
Degree of Util (X)	0.013	0.018	0.01
Departure Headway (Hd)	4.091	3.851	3.639
Convergence, Y/N	Yes	Yes	Yes
Cap	879	933	987
Service Time	2.098	1.859	1.647
HCM Lane V/C Ratio	0.013	0.018	0.01
HCM Control Delay	7.2	6.9	6.7
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.1	0

2023 Build Traffic Volumes

Drake Street TIA
1: Garners Ferry Road & Ceder Terrace Street

11/01/2022

Intersection						
Int Delay, s/veh	21					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	23	1552	1815	28	48	49
Future Vol, veh/h	23	1552	1815	28	48	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	1724	2017	31	53	54

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	2048	0	0 2775 1024
Stage 1	-	-	- 2033 -
Stage 2	-	-	- 742 -
Critical Hdwy	5.34	-	- 5.74 7.14
Critical Hdwy Stg 1	-	-	- 6.64 -
Critical Hdwy Stg 2	-	-	- 6.04 -
Follow-up Hdwy	3.12	-	- 3.82 3.92
Pot Cap-1 Maneuver	118	-	- ~ 35 200
Stage 1	-	-	- 54 -
Stage 2	-	-	- 392 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	118	-	- ~ 27 200
Mov Cap-2 Maneuver	-	-	- ~ 27 -
Stage 1	-	-	- ~ 42 -
Stage 2	-	-	- 392 -

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	\$ 753
HCM LOS			F





Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	118	-	-	-	48
HCM Lane V/C Ratio	0.217	-	-	-	2.245
HCM Control Delay (s)	43.8	-	-	-	\$ 753
HCM Lane LOS	E	-	-	-	F
HCM 95th %tile Q(veh)	0.8	-	-	-	11.1

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Drake Street TIA
2: Drake Street & Clifton Street/Site Access 1

11/01/2022

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	10	4	4	34	4	6	4	4	4	4	35
Future Vol, veh/h	12	10	4	4	34	4	6	4	4	4	4	35
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	11	4	4	38	4	7	4	4	4	4	39
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.2	7.3	7.1	6.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	43%	46%	10%	9%
Vol Thru, %	29%	38%	81%	9%
Vol Right, %	29%	15%	10%	81%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	14	26	42	43
LT Vol	6	12	4	4
Through Vol	4	10	34	4
RT Vol	4	4	4	35
Lane Flow Rate	16	29	47	48
Geometry Grp	1	1	1	1
Degree of Util (X)	0.017	0.033	0.052	0.048
Departure Headway (Hd)	4.015	4.079	4.028	3.606
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	888	877	889	989
Service Time	2.055	2.106	2.051	1.644
HCM Lane V/C Ratio	0.018	0.033	0.053	0.049
HCM Control Delay	7.1	7.2	7.3	6.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.1	0.2	0.2

Drake Street TIA
3: Drake Street & Site Access 2

11/01/2022

Intersection						
Int Delay, s/veh	5.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	4	4	9	4	7
Future Vol, veh/h	28	4	4	9	4	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	31	4	4	10	4	8







Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	25	9	0
Stage 1	9	-	-
Stage 2	16	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	991	1073	-
Stage 1	1014	-	-
Stage 2	1007	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	988	1073	-
Mov Cap-2 Maneuver	988	-	-
Stage 1	1014	-	-
Stage 2	1004	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.7	0	2.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	998	1604
HCM Lane V/C Ratio	-	-	0.036	0.003
HCM Control Delay (s)	-	-	8.7	7.3
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0

Drake Street TIA
1: Garners Ferry Road & Ceder Terrace Street

11/01/2022

Intersection						
Int Delay, s/veh	11.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	1929	1605	58	31	40
Future Vol, veh/h	50	1929	1605	58	31	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	56	2143	1783	64	34	44

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	1847	0	0 2784 924
Stage 1	-	-	- 1815 -
Stage 2	-	-	- 969 -
Critical Hdwy	5.34	-	- 5.74 7.14
Critical Hdwy Stg 1	-	-	- 6.64 -
Critical Hdwy Stg 2	-	-	- 6.04 -
Follow-up Hdwy	3.12	-	- 3.82 3.92
Pot Cap-1 Maneuver	149	-	- 35 233
Stage 1	-	-	- 75 -
Stage 2	-	-	- 297 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	149	-	- ~ 22 233
Mov Cap-2 Maneuver	-	-	- ~ 22 -
Stage 1	-	-	- 47 -
Stage 2	-	-	- 297 -

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	\$ 557.5
HCM LOS			F





Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	149	-	-	-	45
HCM Lane V/C Ratio	0.373	-	-	-	1.753
HCM Control Delay (s)	42.9	-	-	-	\$ 557.5
HCM Lane LOS	E	-	-	-	F
HCM 95th %tile Q(veh)	1.6	-	-	-	8

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Drake Street TIA
2: Drake Street & Clifton Street/Site Access 1

11/01/2022

Intersection	
Intersection Delay, s/veh	7.3
Intersection LOS	A




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	36	34	6	4	20	4	6	4	4	4	4	22
Future Vol, veh/h	36	34	6	4	20	4	6	4	4	4	4	22
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	40	38	7	4	22	4	7	4	4	4	4	24
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.6	7.2	7.2	6.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	43%	47%	14%	13%
Vol Thru, %	29%	45%	71%	13%
Vol Right, %	29%	8%	14%	73%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	14	76	28	30
LT Vol	6	36	4	4
Through Vol	4	34	20	4
RT Vol	4	6	4	22
Lane Flow Rate	16	84	31	33
Geometry Grp	1	1	1	1
Degree of Util (X)	0.018	0.096	0.035	0.035
Departure Headway (Hd)	4.075	4.091	4.027	3.733
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	871	877	887	950
Service Time	2.134	2.115	2.062	1.79
HCM Lane V/C Ratio	0.018	0.096	0.035	0.035
HCM Control Delay	7.2	7.6	7.2	6.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.3	0.1	0.1

Drake Street TIA
3: Drake Street & Site Access 2

11/01/2022

Intersection						
Int Delay, s/veh	3.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	4	9	27	4	5
Future Vol, veh/h	17	4	9	27	4	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	19	4	10	30	4	6

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	39	25	0	0	40
Stage 1	25	-	-	-	-
Stage 2	14	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	973	1051	-	-	1570
Stage 1	998	-	-	-	-
Stage 2	1009	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	970	1051	-	-	1570
Mov Cap-2 Maneuver	970	-	-	-	-
Stage 1	998	-	-	-	-
Stage 2	1006	-	-	-	-

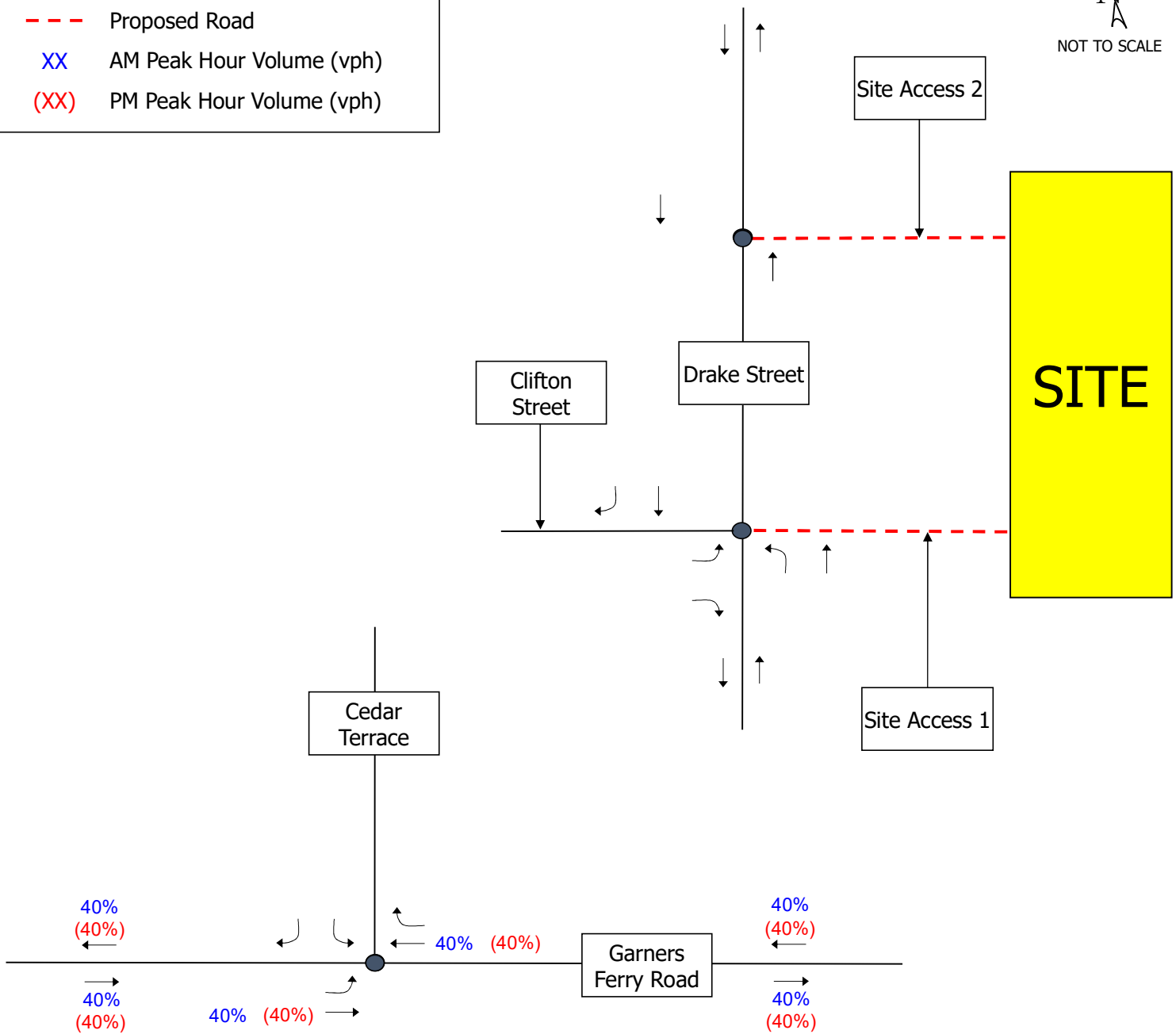
Approach	WB	NB	SB
HCM Control Delay, s	8.7	0	3.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	984	1570
HCM Lane V/C Ratio	-	-	0.024	0.003
HCM Control Delay (s)	-	-	8.7	7.3
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0

Appendix D – Approved Developments

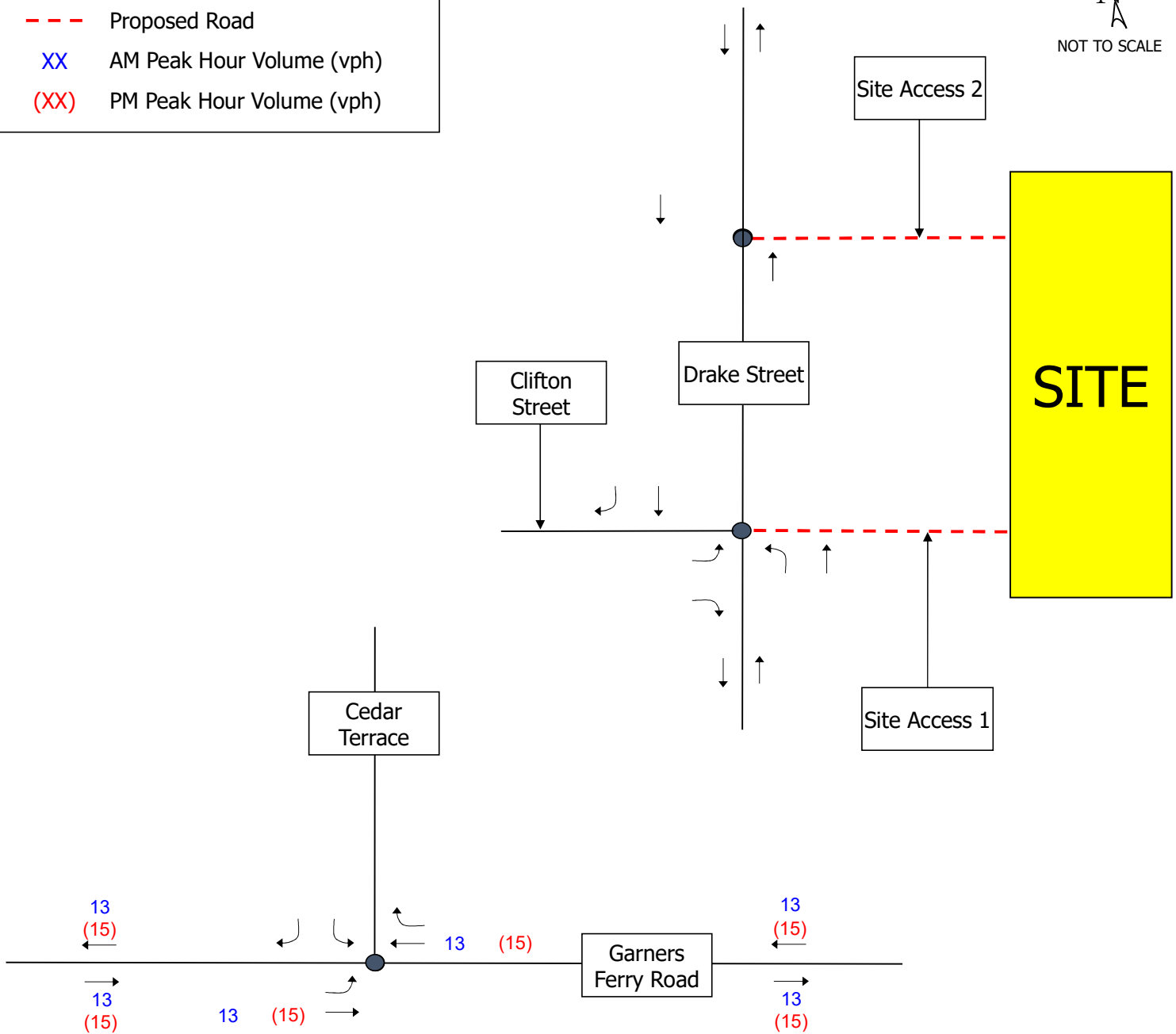
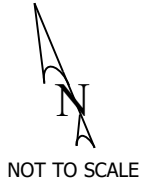
LEGEND:

- Existing Road
- - - Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)



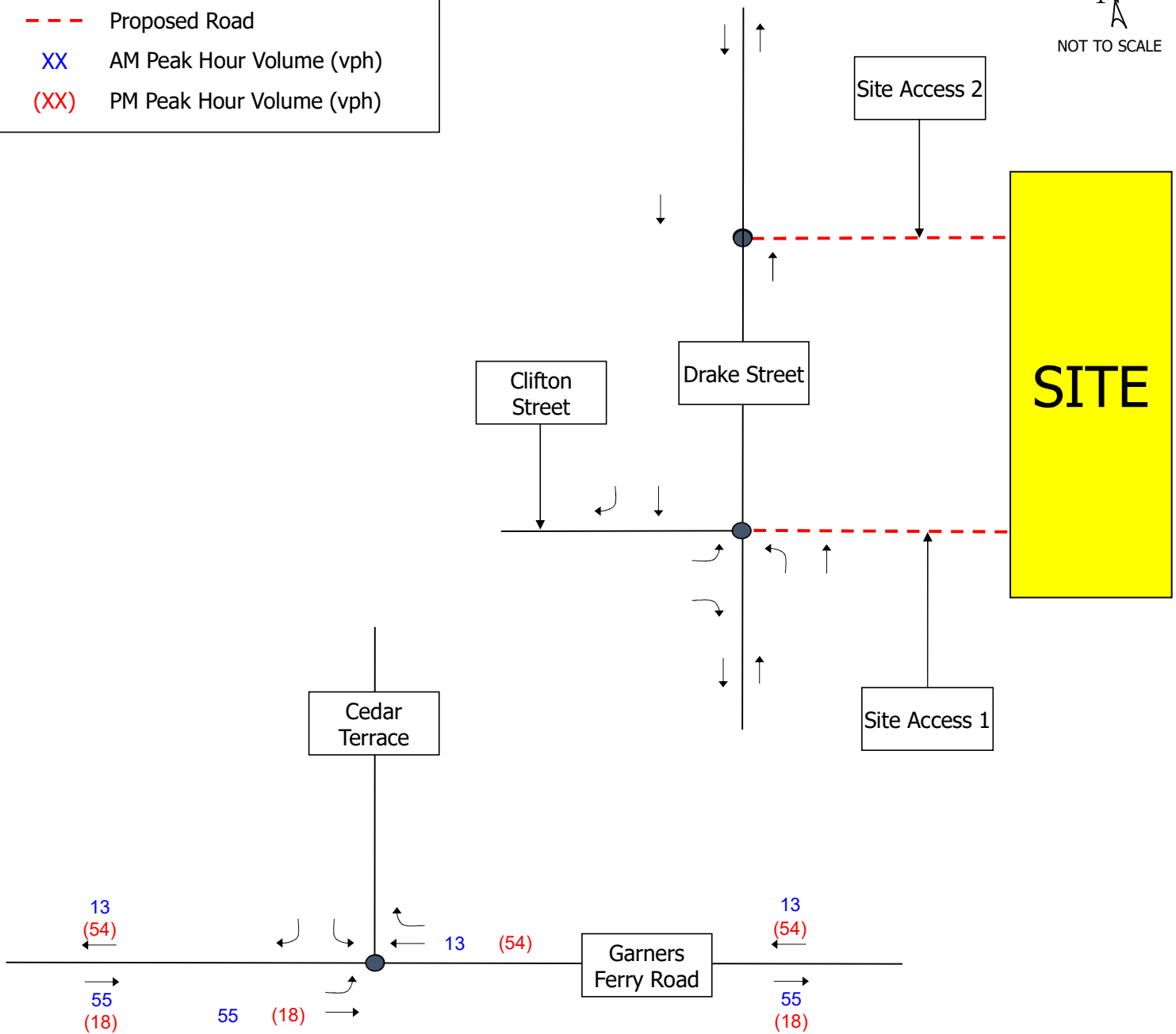
LEGEND:

- Existing Road
- - - Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)



LEGEND:

- Existing Road
- - - Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)



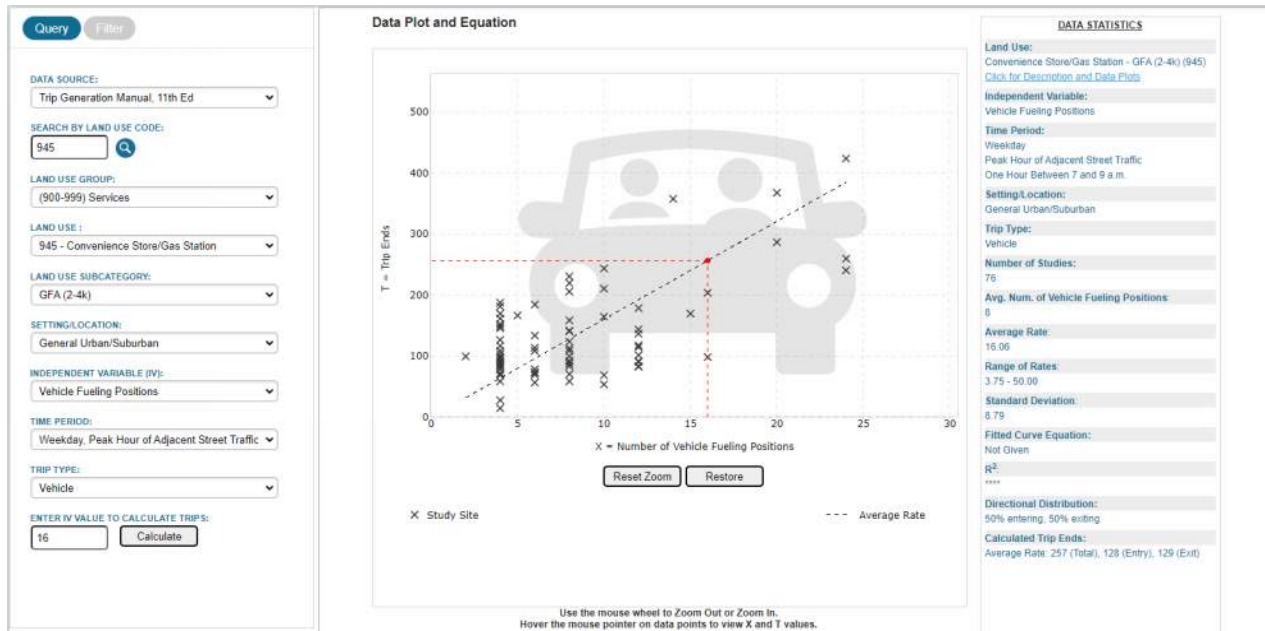
Drake Street TIA Approved Developments Trip Generation

Convenience Store / Gas Station (945)								
		ADT	AM		AM	PM		PM
	VFP		Entering	Exiting	Volumes	Entering	Exiting	Volumes
Rate	16	3383	128	129	257	147	148	295
Pass-by (76%AM/75%PM)		-	97	98	195	110	111	221
Generated Trips		-	31	31	62	37	37	74
40% In Network		-	13	13	26	15	15	30

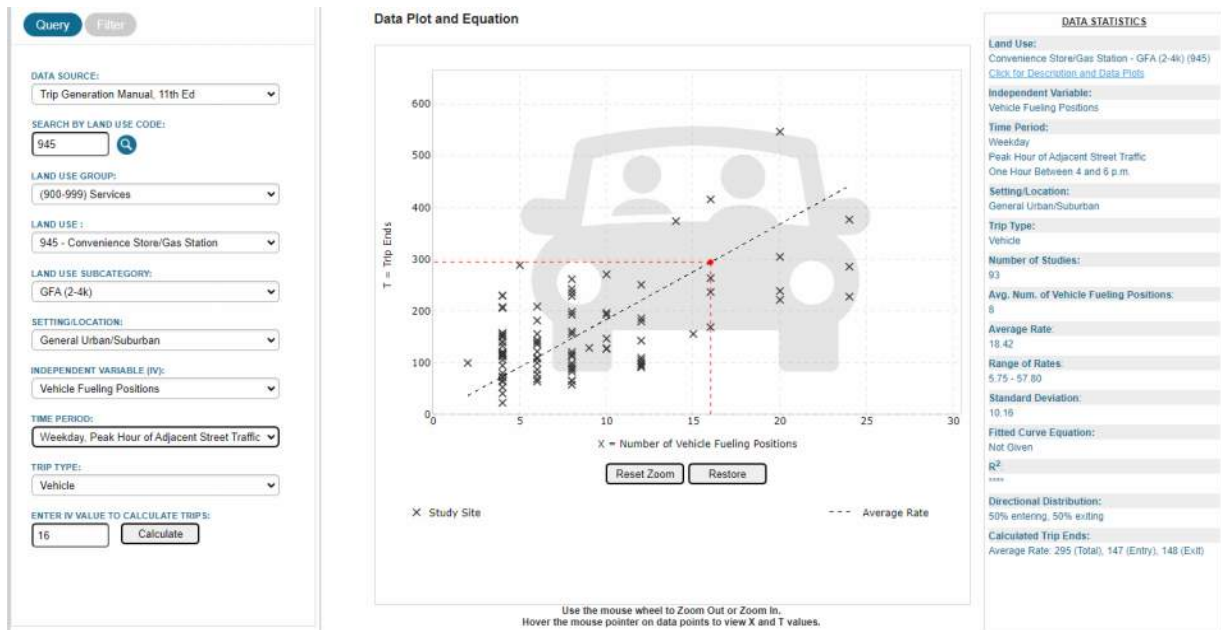
Medical-Dental Office Building (720)								
		ADT	AM		AM	PM		PM
	sqft		Entering	Exiting	Volumes	Entering	Exiting	Volumes
Rate	62500	2096	136	32	168	44	134	178
40% In Network		-	55	13	68	18	54	72

Approved Development- Gas Station

AM

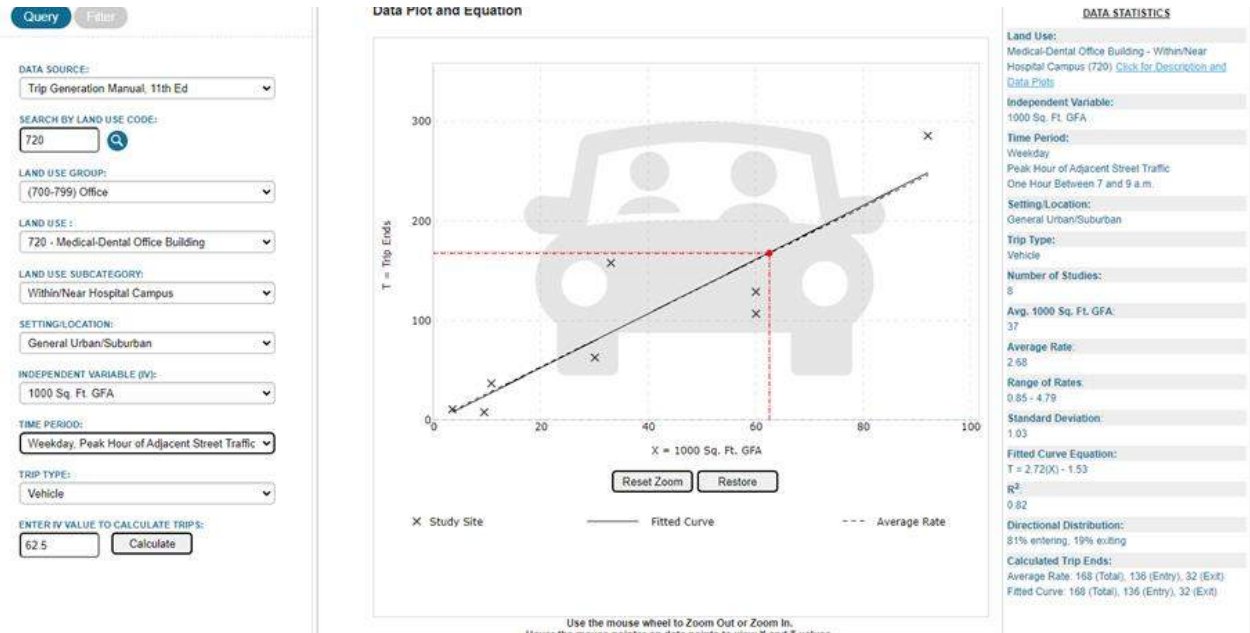


PM

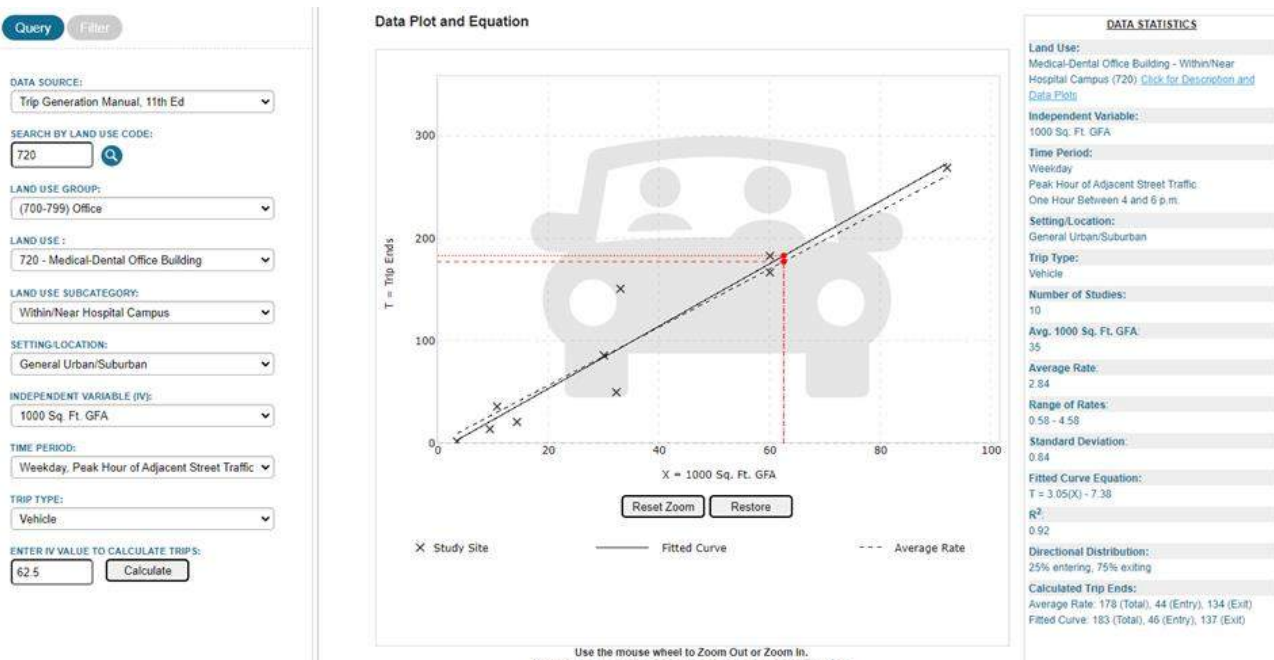


Approved Development- VA Expansion

AM



PM

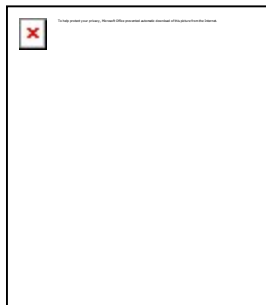


Cliff Lawson

From: Chambers, Johnathan E <Johnathan.Chambers@columbiasc.gov>
Sent: Tuesday, September 6, 2022 10:35 AM
To: Cliff Lawson
Cc: Jeff Hochanadel; Burnette, Richard B (Brandon)
Subject: RE: [EXTERNAL] Approved Development Question

Sounds good. Take care!

Johnathan



Johnathan E. Chambers, Land Development Administrator
Planning and Development Services

1136 Washington Street, Columbia, SC 29201

Phone: 803.545.3206

johnathan.chambers@columbiasc.gov

www.columbiasc.gov/planning-development

From: Cliff Lawson <Cliff.Lawson@timmons.com>
Sent: Friday, September 2, 2022 8:36 AM
To: Chambers, Johnathan E <Johnathan.Chambers@columbiasc.gov>
Cc: Jeff Hochanadel <Jeff.Hochanadel@timmons.com>; Burnette, Richard B (Brandon) <Richard.Burnette@columbiasc.gov>
Subject: RE: [EXTERNAL] Approved Development Question

Some people who received this message don't often get email from cliff.lawson@timmons.com. [Learn why this is important](#)

Hello Mr. Chambers,

From a site visit yesterday, I noted an Express Gas Station and the Fisher House project being constructed. I'll be sure to include those developments.

Thanks,

Cliff Lawson, PE, PTOE

Senior Project Manager

Office: 919.866.4946 | Fax: 704.376.1076

From: Cliff Lawson
Sent: Thursday, September 1, 2022 11:08 AM
To: Chambers, Johnathan E <Johnathan.Chambers@columbiasc.gov>
Cc: Jeff Hochanadel <Jeff.Hochanadel@timmons.com>; Burnette, Richard B (Brandon) <Richard.Burnette@columbiasc.gov>
Subject: RE: [EXTERNAL] Approved Development Question

Hello Mr. Chambers,

In order to meet our project schedule, we are moving forward assuming there are no approved developments in the study area that will be built by 2023. If you have any questions, please let me know.

Thanks,

Cliff Lawson, PE, PTOE

Senior Project Manager

Office: 919.866.4946 | Fax: 704.376.1076

From: Cliff Lawson

Sent: Wednesday, August 24, 2022 10:22 AM

To: 'Chambers, Johnathan E' <Johnathan.Chambers@columbiasc.gov>

Cc: Jeff Hochanadel <Jeff.Hochanadel@timmons.com>; 'Burnette, Richard B (Brandon)' <Richard.Burnette@columbiasc.gov>

Subject: RE: [EXTERNAL] Approved Development Question

Hello Mr. Chambers,

I just wanted to follow-up to see if there were any approved developments in the study area described in our previous email correspondence.

Thanks,

Cliff Lawson, PE, PTOE

Senior Project Manager

Office: 919.866.4946 | Fax: 704.376.1076

From: Cliff Lawson

Sent: Monday, August 15, 2022 11:30 AM

To: Chambers, Johnathan E <Johnathan.Chambers@columbiasc.gov>

Cc: Jeff Hochanadel <Jeff.Hochanadel@timmons.com>; Burnette, Richard B (Brandon) <Richard.Burnette@columbiasc.gov>

Subject: RE: [EXTERNAL] Approved Development Question

This is a relatively small development so I would assume anything in a quarter mile.

Thanks,

Cliff Lawson, PE, PTOE

Senior Project Manager

Office: 919.866.4946 | Fax: 704.376.1076

From: Chambers, Johnathan E <Johnathan.Chambers@columbiasc.gov>

Sent: Monday, August 15, 2022 11:28 AM

To: Cliff Lawson <Cliff.Lawson@timmons.com>

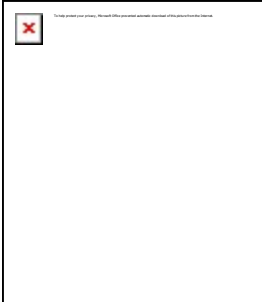
Cc: Jeff Hochanadel <Jeff.Hochanadel@timmons.com>; Burnette, Richard B (Brandon) <Richard.Burnette@columbiasc.gov>

Subject: RE: [EXTERNAL] Approved Development Question

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Good morning! What proximity are you interested in?

Johnathan



Johnathan E. Chambers, Land Development Administrator
Planning and Development Services

1136 Washington Street, Columbia, SC 29201

Phone: 803.545.3206

johnathan.chambers@columbiasc.gov

www.columbiasc.gov/planning-development

From: Cliff Lawson <Cliff.Lawson@timmons.com>

Sent: Thursday, August 11, 2022 5:10 PM

To: Chambers, Johnathan E <Johnathan.Chambers@columbiasc.gov>

Cc: Jeff Hochanadel <Jeff.Hochanadel@timmons.com>

Subject: [EXTERNAL] Approved Development Question

You don't often get email from cliff.lawson@timmons.com. [Learn why this is important](#)

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Mr. Chambers,

My name is Cliff Lawson and I'm a traffic engineer with the Timmons Group. We have been contracted to complete a traffic impact analysis for a residential development off Drake Street (near Garners Ferry Road) in Columbia, SC (see image below). It is assumed this development will be built by 2023. I was given your contact information by David Brewer. Are you aware of any approved developments in the general area that will be built by 2023?

